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Evolution, trends and future of native media: From avant-garde to the epicenter of the communications ecosystem

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Abstract

Over recent decades, digital native media have flourished as one of the most important communicative tools in the world, despite certain geographical disparities. Not only is this kind of media here to stay, but they have transitioned from being a feature of the avant-garde to occupying a central space in the digital ecosystem. Despite the diversity of models, difficulties in articulating business models that ensure sustainability, and their lack of financial muscle, native media have opened up renewed options for digital journalism in both the present and the future. By analyzing the current media landscape and a study of the main trends, carried out using a review of the published scientific literature and an analysis of cases from the last five years, this paper explores the horizons of the "new wave" of digital native media that will face the challenges of the second half of this third decade of the millennium. Of course, the future has not yet been written: digital media will have to build from the native space, observing emerging trends, modern technologies, and without giving up on providing quality digital journalism that is based in truthfulness, transparency, the involvement of users and the set of actions that serve the public interest.

Keywords

Digital native media; Cybermedia; Online media; Digital media; Evolution; Trends; Future; Challenges; Digital journalism; Digital-born; Mobile communication; Communication; High technologies; News; Journalism; News ecosystem; Ubiquity.

1. Introduction

Born and developed online, digital native media are not only present in the media landscape, but also make up a sector of products that, despite their diversity, have common features. Although they have always looked towards traditional media and digital migrants (legacy media) for guidance and inspiration, they have also carved out their own identities in real time based on the characteristics of the modern context. Unlike traditional media, very few have had to rely on an industrial plant as, traditionally, most needed a site within an industrial estate. Rather, their organizational model has been much more functional and less bureaucratic than that of the companies born out of the industrialization of the last century. Digital newsrooms are smaller in size and have more open organizational models. Strategy has always focused on the Internet, often exclusively, and initiatives of varying degrees of innovation were implemented.

Since the start of the third millennium, after the "dot com" crisis, digital native media entered a new, irreversible phase in which each progression constituted a leap forward. Eventually, it became the new flourishing phenomenon of the digital communicative ecosystem. Many of these avant-garde initiatives, which broke down barriers and introduced new formats and rejuvenated the ways that daily events were reported on, fueled changes in media as a whole. This landscape was dominated by experimentation and rapid responses to challenges, sometimes without much reflection and without firm studies. A strong knowledge of the intricacies of the network society, and the ability to identify trends, served digital outlets as an asset in achieving success. With that being said, many times these results were only achieved thanks to sectoral strategies. Furthermore, they fueled imbalances and fostered weak points that led to problems in the medium term. There were successes, but there were also much talked-about failures.

The truth is that, regardless of these successes and errors, as the number of initiatives increased between 2010 and 2020, the internet became a hotbed of digital native media. The explosion of hyperlocals expanded the native media landscape and their presence in the digital communication ecosystem went from peripheral to significant, until it formed a network that is at the epicenter of the current setting. Despite difficulties in finding business models that ensure their sustainability, the limitations of their informative projects and the difficulties in retaining and managing their communities, hyperlocals are no longer only attractive to professionals, investors, political scientists and a long list of social actors, but it is a basic link for the structuring of models of current plural, democratic and participatory societies. Their role, as digital media, encourages debates on the ways to build more prosperous contemporary societies, and on the state of digital journalism and how it should evolve going forward.

2. The state of attitudes towards reinvention

The rise of digital native media outlets and their journalistic output must be understood as, for study and research, a phenomenon occurring within the field of digital journalism. Digital journalism studies go beyond journalism produced, distributed and consumed with the help of digital technologies (**Steensen**; **Westlund**, 2020). Certain questions about the reinvention of journalism within a platformed scenario must be raised about. Also, in relation to the new role of users in the production and distribution of news and about all the changes that have occurred. These include how news is searched for, the technologies used in the elaboration of informative pieces, their dissemination, their extended and "transmediated" discourse and their uses and consumption, in the shadow of a turbine that drives communicative ebbs and flows.

The formation of the current communicative ecosystem, emerging after the appearance of the internet and hand in hand with the evolution of the digital society in the third millennium, has a multitude of actors of various kinds. Among them, the media, old and new, stand out, as do the technological platforms and their social networks. It is precisely those, as a new power within the ecosystem (**Hanna**; **Rohm**; **Crittenden**, 2011), that are transforming both the digital media landscape and the practices of users (**Alaimo**; **Kallinikos**; **Valderrama**, 2020). This forces practically all companies –especially digital media outlets, created in and inhabiting this ecosystem– to redesign their strategies for future action, prioritizing social network strategies (**Li**; **Larimo**; **Leonidou**, 2020).

The interaction between the media and social networks has been very intense in the last ten years. There has been both friction and collaboration. The evolution of the communicative ecosystem of the network society showed how social networking sites have become essential to the way people receive and experience news (**Bergström**; **Belfrage**, 2018). Consequently, the media and journalists sought out their own space and, in parallel, informative initiatives have appeared exclusively on these platforms. In these years, the trends and fads of online platforms "come and go." Nonetheless, the truth is that news users interact on social networks and the media have had to search for users within them (**Larsson**, 2018), in their efforts to ensure a better-informed society, even if the results aren't guaranteed.

Social networks and media show certain similarities in relation to journalism. For example, both are communication channels. However, there are also disparities that are just as relevant. Nonetheless, there is no doubt that there is mutual interaction and that they influence each other. In a communicative and social context of today, characterized by disintermediation and reintermediation, the complexity of the relationships between social networks and the media reveals many questions to which answers must be sought via greater scientific research in the field (**Moreno**; **Sepúlveda**, 2021).

> " Social networks and media interact and influence each other "

In this complex scenario, with a renewed communicative ecosystem after almost thirty years, digital journalism is a consolidated reality, not only professionally, but also academically (**Salaverría**, 2019). There are many challenges for both media institutions and media professionals, as well as for those who investigate the field. The journalists themselves, having to deal directly with technological and social changes, take on these challenges. They are aware of the fact that technology has entered the field via a continuous and sustained process, marked by disruptive elements, to the extent where it is now assumed that all modern-day journalism is digital (**Perreault**; **Ferrucci**, 2020).

Digital technology is of great relevance in the evolution of this field, especially since the emergence of "high technology." However, the study of digital native media and the journalism that they produce must include an analysis of the steps taken that led to reinvention. This was achieved through a process of conceptualization based on new opportunities to work with large amounts of data, the elaboration of comprehensive information, new options to investigate power, the ability to interact with users and to tell the different sides of complex, polyhedric stories (**Waisbord**, 2019).

Digital native media outlets and their journalistic product borrow from traditional journalistic practices established in the midst of industrialization. Nonetheless, their products and practices directly confront the modern, unprecedented challenges related to the search for, production of and circulation of news content in today's network society. These native media have attained greater prominence and consolidated their relevance just as digital journalism faces the challenge of redefining its field based on perspectives and approaches that have emerged in the last two decades (**Eldridge** *et al.*, 2019) and within the contemporary landscape marked by liquidity and ubiquity (**Aguado**, 2020).

The journalistic field has expanded in the last twenty years, against the backdrop of the introduction of renewed journalistic practices, uncovering the need to overcome the limits and expand on the referential frameworks that defined the discipline in the past (**Witschge**; **Deuze**, 2020). In this process, it is necessary to incorporate all emerging phenomena and their output into the field of study in order to better understand how to secure a better future for digital journalism in this third decade, in which digital native media provide a reference point.

For years, many journalists have been practicing their profession and earning a living based on work they do for institutions outside of those that traditionally dominated the journalistic industry (**Deuze**, 2019). Despite the changes, journalism continues to uphold its basic principles. This is true of just the traditional institutions, but also for peripheral actors (**Holton**; **Belair-Gagnon**, 2018), many of whom are progressively becoming a fundamental and essential part of modern journalism (**Hermida**; **Young**, 2019). Within this evolution, some of the most important actors have been the digital native media outlets.

The pandemic has accelerated the transformation of the media (**García-Avilés**, 2021), both digital native media and old-guard media, which is likely to fuel further transformative processes within digital journalism. This "leap forward" by the media in regards to digital transformation, the results of the hybridization of journalistic culture in different places (**Mellado** *et al.*, 2017), new journalistic practices, and the role of new actors on the periphery of the field, must be the subject of academic future research regarding journalism's great expansion. Many of the changes experienced in recent years spurred on by technology cannot be reversed. In fact, they are set to be permanent features within digital journalism that are here to stay. Today, these innovations are core elements of journalistic work and of the journalistic profession.

The object of study, in short, "shifts" as the ecosystem undergoes an accelerated transformation, with digital native media as central actors, and many of the answers from the past require, at the very least, the addition of certain nuances. The phase of adaptations and transformations for the media and for journalism has not come to an end, but has only entered a new stage, now driven by virtual reality, artificial intelligence, 5G and a long list of communication technologies that entail new challenges. From the announcements and promises we will soon know what remains and the direction that, depending on the outcome, digital journalism follows. The only thing that is certain is that digital native media and the journalism that they provide new generation citizens will occur within that setting.

3. Mobility and ubiquity as axes

Facing the fourth digital wave –the age of the Internet of Things– (**Salaverría**; **De-Lima-Santos**, 2020), many digital native media that have emerged from this constantly changing ecosystem already accept that they may not be able to survive without the ability to adapt to new settings. To participate in technological innovation means becoming familiar with mobile journalism, artificial intelligence and big data (**Aguado**; **Silva**, 2022). Going over and redesigning pre-existing business models doesn't suffice. Rather, it is essential to adopt innovation in formats and user experiences. Furthermore, all of this must take place regardless of loss of media leadership in favor of third-party platforms (**Wheatley**; **Ferrer-Conil**, 2020).

It is true that two of the axes of the current transformation –mobility and communicative ubiquity– are already familiar to certain digital native media outlets, since a significant number of them were born in this context. However, the effects of disruptive technologies and changes in information uses and consumption require the facing of complicated challenges that may call into question certain business models, as well as certain strategies applied, both in production and in the relationship with users.

> The ecosystem is undergoing an accelerated transformation, with digital native media as central players

Those strategies include exploiting multi-sensory, narrative immersion, automating certain content and professional routines, and improving interaction models with the audience.

> It is not enough to rethink business models; innovation in formats and experiences is essential

The data on the evolution of the native media landscape indicates that those who rest on the "laurels of success" enter, when they least expect it, into a series of scares. Often, this leads them towards the depths of the digital market and marks the end of activity. The impact of mobile technology –the smartphone, wearable technologies, Big Data, Internet of things, artificial intelligence, etc.– fuels ubiquitous mediations and drives the redefinition of the media ecosystem through new forms of intermediation, the consolidation of new consumption scenarios, the congruence between hypervigilance and self-surveillance, the new centrality of social interactions, the "emotionalization" of public discourses and the transformation of privacy or affective work into merchandise (**Aguado**, 2020). It also creates new stages, with renewed dynamics in which intervention is only possible with updated strategies.

The mobile era has brought communicative convergence into a new era (**López-García** *et al.*, 2019) and technological innovation has permeated the domains of politics, culture and society (**Fussey**; **Roth**, 2020). This world is characterized by features such as the application of ultra-fast communication technologies, ultra-intelligent devices and challenges on cyber security, digital media training, social control and individual well-being. It is a setting in which the excessive use of the digital brings social problems and shows the need to hone our skills and abilities. What is needed is more empirical research on how people can maintain a high level of well-being in a digital society despite (also thanks to) the omnipresence of digital ICTs in practically all areas of life (**Büchi**; **Festic**; **Latzer**, 2019).

As digitization has far-reaching implications for people, organizations and society, efforts to explore both the dark and unpredictable nature of digitization (**Trittin-Ubrich** *et al.*, 2021) and the positive effects of technological innovation. This process often takes place outside the journalistic field (**Wu**; **Tandoc**; **Salomon**, 2019) and is then "constructed", internalized and negotiated by agents from the journalistic field (**Lindblom**; **Lindell**; **Gidlund**, 2022) which are likely to be scarce. Nonetheless, with a plethora of relevant information and accurate strategies relating to mobility and ubiquity, the challenges can be met, especially in the field of technologically mediated communication.

4. The territories of metacommunication

State-of-the-art technology has opened doors for experimentation, exploration, and speculation. Virtual reality and augmented reality are already part of the current transformation of digital native media. When the metaverse is announced as the next turning point in the field of communication –especially in business–, we become conscious that, sooner or later, it will become a reality. Within the expansion of the physical world, digital native media will act and intervene, which will bring to the fore new challenges for digital journalism.

However, the technological race to confront and overcome obstacles is not limited to those goals related to the expansion of the physical world. Now Web3 is knocking loudly at the door, encouraging some digital native initiatives to redefine their priorities in order to take advantage of new ways to monetize files and intellectual property, to explore forms of sponsorship or reward users offered by this new phase of the web, –which incorporates decentralization based on blockchain– something that the journalism of the digital native media could use. This path is not without danger, and is littered with questions and doubts. Nonetheless, it is one that, according to the defenders of the potential of the blockchain, will grant users more control over the network, in their initiatives, and allow for the opening of renewed business channels.

In the journey toward metacommunication, in which digital native media stand out as a central actor in the construction of a promised future, there is a great challenge: how to turn high technology into an engine for better digital journalism, representing verified information and truth, and with a commitment to serving the public interest. The challenge for digital journalists, regardless of their experiences in a platformized society, lies in taking advantage of all the tools available to them to produce pieces that promote quality information on the modern stage where liquid and ubiquitous communication reigns.

As in the past, the authority and democratic role of news journalism, draws upon a set of updated values and has adapted to the digital scenario of today's network society (**Hacup**; **O'Neill**, 2017), is based on accurate and verified information (**Ekström**; **Westlund**, 2019). It is one of the essential elements of journalism and, if one day it disappears, the result will be another communication technique that, with Web3 the metaverse outlined above or any other dimension of the field of metacommunication, even if it shows great communicative efficiency, will not be fit to be called digital journalism. The discipline of verification remains essential and one of the fundamental elements of journalism in digital native media.

In the third decade of the third millennium, when all journalism is digital, the new journalistic ecosystem rests on two emerging media models: digital natives and non-natives (**Salaverría**; **Martínez-Costa**, 2021). The former model, with structures and techniques born and nurtured in the digital environment, not only shows a great diversity of typologies, but also contains the essence of the structures that, overshadowed by the metacommunication territories, are sure to nurture the best digital journalism of the future.

5. On the threshold of a new cycle

Somewhat luckily, digital journalism has entered a new cycle that powers artificial intelligence and the Internet of Things. The processes of adaptation to the new reality, driven by disruptive technologies and actors, have led to a metamorphosis and a reinvention. Without compromising the basics, new dimensions have been incorporated that enrich the "total journalism" of the third decade of the twentieth century of the current millennium. This digital journalism has made progress, hand in hand with innovation, in diversity of movements and ways of understanding the profession. It has also incorporated renewed profiles in accordance with the skills and abilities required in the current digital setting. It is neither better nor worse than the journalism of the 20th century, but it is different, with more dimensions, models, formats and relationship with users. Ultimately, it contains more informative potential.

Current digital journalism, which has in native media a potential ally in the promotion of change and innovation, given that it was designed specifically for the world of the network society and to integrate some of its essential elements, has its progress limited by the effects of many of the gaps that have characterized the construction of the so-called information society and the pending challenges (sustainable business models, updating of the regulatory framework, tensions with technological platforms, surveillance supervision, accountability/transparency, media training…). The future, as all the actors in the sector share, must be worked towards day by day. However, digital journalism, which functions within society and belongs to society, has to achieve that future through alliances with the most dynamic sectors involved in the construction of a setting that ensures services of general interest (journalism as a service to people and with people) within today's complex societies. This is, without a doubt, one of the great challenges of digital journalism in relation to the pursuit of quality and excellence.

Technological developments and their transformed potential have affected ideology, self-perception and the way that the limits of the profession are understood (**Kyriakidou**; **García-Blanco**, 2021). This process of change isn't over, though. Experts, technologists or otherwise, predict continuous evolution, which implies constant adaptation to the technological revolution within every changing social, political and economic contexts. The digital journalism of today, which is more than just digital technology (**Zelizer**, 2019), takes on the challenges of continuous evolution that will surely give rise to renewed professional practices influenced by the context of current and future hybrid media. Academic journalism needs to investigate these transformations in order to strengthen journalistic thought, which is in great need of disciplinary, interdisciplinary and transdisciplinary visions that enrich its solid foundations, using modern observations to foster future prospects.

From our experiences in the field of digital journalism, those promoted by traditional media and by digital natives, we have reasons to be dissatisfied. Furthermore, it is normal that taking risks can lead to fear and unease. However, renovated digital native media that cultivate quality, modern, proactive, dynamic, participatory and sustainable journalism must be included in the quest for a better future. Digital native media, now at the epicenter of the communications ecosystem, are posed with the challenge of making this a common goal amongst the most dynamic sectors of today's societies a reality.

The experiences of the past and the present in the field of digital journalism are the prologue, the prelude of what is to come, in terms of modern digital journalism. The stories of people, events, social dynamics will still

> High-tech poses a new challenge for digital journalism

exist in the year 2025, 2050 and 2075, and digital journalism, hand in hand with digital native media, will have to tell these stories through quality pieces, with truthful information, in formats, channels, and expressive modalities that are specifically adapted to do so. This will be done in alliance with the most committed and innovative sectors of these societies, so as to be a force in the present and in the future, in a media ecosystem where everyone will already be native or neo-native.

Judging by the current panorama and that which is on the horizon, there is little doubt here that the future of digital journalism relies on the 'N' of natives and neo-natives. Time will tell if our predictions are correct.

6. Conclusion

Digital native media, as part of a flourishing process in the present, will have a central role in the future of technologically mediated communication and, above all, in digital journalism. Digitization, that irreversible, difficult to control and innovative process in the field of communication, has placed digital native media in a pre-eminent position. Though neither better nor worse than legacy media or digital migrants, they contain some clearly differentiated characteristics. Most importantly, digital native media were born in and for the digital world. Its DNA is made up solely of information relating to the different steps and stages of the network society and the liquidity that characterizes it.

Although the originality of their models differs from legacy media –some have built unique structures, while others have limited themselves to imitation and the reproduction of models–, there is no doubt that digital native media as a whole have breathed new life into the journalistic fabric (in relation to narrative experiences, formats, use of tools, etc.). At the same time, they have revived old and new debates on borders, on central and peripheral actors in the field of information, on depth and real time, on ethical issues and, ultimately, on the quality of journalism and its role in today's

societies, notably marked by trends that feed into disintermediation processes established in the recent past.

In a scenario marked by the appearance and disappearance of digital native media, with very fragile business and sustainability models, the data indicate an array of important challenges on the immediate horizon. As we find ourselves in the midst of the fourth wave of digitization –the one that characterizes the Internet of Things– digital native media are looking for ways to ensure their future and to create frameworks that make today's digital journalism possible.

> The future of digital journalism relies on the 'N' of natives and neo-natives

If native media outlets are able to secure the always necessary citizen support, they can build memorable pieces of a digital journalism that seeks, hand in hand with "total journalism", to add value (not only through verified information, but through work that evidences the style and talent of professionals with different profiles in various countries) towards better-informed societies.

Digital native media, which in many cases have been at the forefront of the communication processes of the digital world, have reached the epicenter of the media ecosystem with several lessons learned and many challenges ahead. Their challenge is to build the future "day by day", in society and with society. Citizens, within small or large communities, will have the last word.

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Letter. Journalology: an unrecognized science for a century

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Abstract

The origin, evolution, and different meanings that various authors have given to the term "journalology," defined as the "science of publication," throughout the almost 100 years since it was coined, are discussed.

Keywords

Journalology; Science of publication; Journal editing; Academic publication; Scholarly journals; Bibliometrics.

1. Origin and evolution of the concept

Johnson (1928) coined the term "journalology" to transform the journalism departments in educational institutions, and to name it as a new science. He also provided a brief definition: "publication science." Since the *Centre for Journalology* was established at the *Ottawa Hospital Research Institute* in Canada, the subject has become more well known (**Chandrakumar** *et al.*, 2018; **Krishan**; **Kanchan**, 2019).

This concept has been considered by some researchers for a variety of reasons. For instance, **Wilson** and **Moher** (2019) looked at how journalology is evolving in the field of health sciences. **Galipeau** *et al.* (2015) looked into the efficacy of peer review training, journal editing training, and writing for scholarly publishing in the quality of health research reporting. Poor journalology, according to **Kumar** (2013), indicates insufficient peer review training. According to **Moher** and **Ravaud** (2016), a journal research network can significantly advance the fields of journalology and meta-research.

Kumar (2015) contended that scientific publishing involves three areas: authors who want to publish their work, readers who want to read quality content, and eventually science by making the best research widely available. Concepts as diverse as metascience, predatory publishing, journal ranking, and bibliometrics are all directly linked to journalology, according to **Asgarov** (2022).

2. The need for more understanding of the science of publishing

In general, there is a lack of adequate understanding of the science of publishing. For instance, misconduct in research accounted for nearly two-thirds of retraction notices to Indian biomedical literature (**Elango**, 2021). This applies to editors, as well. For instance, a few editorial articles have been retracted (**Elango**, 2022). In addition, the *Saudi Journal of Anaesthesia* recently published an article entitled "A scoping review of retracted publications in anesthesiology"

(**Fiore** *et al.*, 2021)*.* The study seemed to deal with a scoping review based solely on the title. However, it actually made no effort to support the scoping review, and further, the authors listed the reasons for retractions collected from the database without any classification or grouping. As a result, editors also require appropriate training in publication science.

According to a recent statement by **Asgarov** (2022), journalology is now accepted as a discipline that investigates all of the processes of academic publishing and teaches researchers how to select the best journals for publication and what the essential elements of publishing a high-quality journal article are.

In contrast, none of the following authoritative dictionaries offer any information on the word "journalology":

https://ohri.ca/journalology

- *Collins Online Dictionary*
  https://www.collinsdictionary.com
- *Dictionary.com*
  https://www.dictionary.com
- *Wiktionary*
  https://en.wiktionary.org
- *Cambridge Dictionary*
  https://dictionary.cambridge.org

- *Merriam-Webster*
  https://www.merriam-webster.com
- *Oxford Learner's Dictionaries*
  https://www.oxfordlearnersdictionaries.com
- *Encyclopedia Britannica*
  https://www.britannica.com
- *Macmillan Dictionary*
  https://www.macmillandictionary.com

Online databases can be used to monitor the growth of the literature on a given subject (**Lancaster**; **Lee**, 1985). The large abstracting and indexing database *Scopus* was searched for the volume of literature published on the topic "journalology," which returned only 64 documents (Graph 1), covering a period of 95 years. This represents less than one article per year. Compared with some recently developed topics, such as the *h*-index (**Hirsch**, 2005), which was only introduced in 2005 but has more than 5,000 documents in *Scopus*, the volume of literature on journalology is very small. The years of publication for articles about journalology were inconsistent. The next article was not published until 62 years after the 1928 publication of the first article on journalology, and there were some years when nothing was published; For instance, in 1991, 1993, 1995–2000, 2006, 2011–2012, and 2014, there were no publications. The peak year with the highest number of articles (*n* = 8) was 2019. There is not much published scientific literature on this topic. Scientific publications are not required to necessarily include the appropriate keywords for subjects such as biology, geology, psychology, sociology, technology, and zoology because these topics are regarded as fundamental sciences. In a similar vein, journalology —the science of publishing— is to be considered as one of the basic sciences.

To inculcate publication science among students and scholars, many researchers have recommended that every higher education institution –especially those focused on research– establish a journalology center (**Krishan**; **Kanchan**, 2019; **Asgarov**, 2022). However, it also needs to be inculcated among all the stakeholders, including journal editors.

3. Concluding remarks

Journalology is the study of how scholarly research is disseminated and published. As stated by **Johnson** (1928), it has nothing to do with journalism because it is a combination of the word "journal," which is a periodical that contains experiences, experiments, and observations, and the suffix "-*ology*," which denotes a field of study or learning. Moreover, it is multidisciplinary in nature and covers a variety of topics, such as publication/research ethics, peer review processes, editorial policies, studies related to journals, and the use of metrics and other indicators to gauge the significance of the scientific method among the scientific community while also improving the transparency and quality of scientific research and publishing.
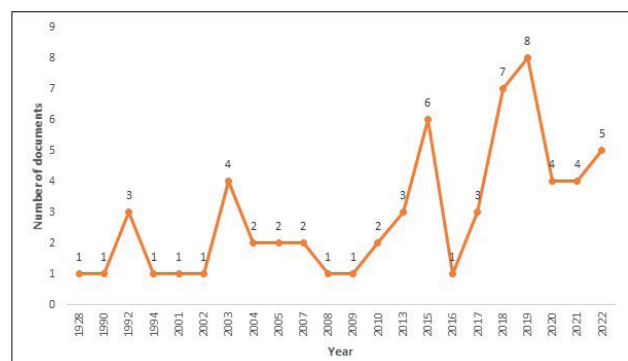
Graph 1. Yearly trend of literature on journalology. Source: *Scopus.*

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Without journalists, there is no journalism: the social dimension of generative artificial intelligence in the media

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Abstract

The implementation of artificial intelligence techniques and tools in the media will systematically and continuously alter their work and that of their professionals during the coming decades. To this end, this article carries out a systematic review of the research conducted on the implementation of AI in the media over the last two decades, particularly empirical research, to identify the main social and epistemological challenges posed by its adoption. For the media, increased dependence on technological platforms and the defense of their editorial independence will be the main challenges. Journalists, in turn, are torn between the perceived threat to their jobs and the loss of their symbolic capital as intermediaries between reality and audiences, and a liberation from routine tasks that subsequently allows them to produce higher quality content. Meanwhile, audiences do not seem to perceive a great difference in the quality and credibility of automated texts, although the ease with which texts are read still favors human authorship. In short, beyond technocentric or deterministic approaches, the use of AI in a specifically human field such as journalism requires a social approach in which the appropriation of innovations by audiences and the impact it has on them is one of the keys to its development. Therefore, the study of AI in the media should focus on analyzing how it can affect individuals and journalists, how it can be used for the proper purposes of the profession and social good, and how to close the gaps that its use can cause.

Keywords

Media; Journalism; Generative artificial intelligence; Algorithms; Audiences; Journalists; Automation; News; Digital divide; Society.

1. Introduction

The advance of disruptive technologies that deepen the digitization of the media affects some of the issues that until now had been considered exclusively human. In addition, according to the analysis of the media's own discourse on artificial intelligence (AI), AI itself will be omnipresent and applicable to any type of task performed by people (**Brennen**; **Howard**; **Nielsen**, 2022).

Generally speaking, the indiscriminate use of the term "artificial intelligence" has led to its use with a wide variety of meanings (**Broussard** *et al.*, 2019), always referring to processes in which technology simulates human intelligence and that allows for computers and machines to behave in a similar way to people.

AI encompasses a complex set of techniques from the field of computer science that cut across all disciplines and social domains, and which can be further divided into seven sub-areas: machine learning, computer vision, speech recognition, natural language processing, automatic planning, expert systems, and robotics (**De-Lima-Santos**; **Ceron**, 2021).

Today, the development of AI in industrial processes is high on the research agenda at every level, and the anticipated potential benefits are not only limited to the economic and industrial dimensions, but also extend to the social sphere. Thus, the *European Commission*'s "White Paper on Artificial Intelligence" (2020) considers that its use can make it possible to meet challenges such as improving the quality of democracy or the provisioning of quality public services. The centrality of the service to citizens, and not the simple technological development of an industrial process, is one of the characteristics that should define this process so that it contributes to achieving sustainable economic and social growth (*Comisión Europea*, 2020).

Despite these promises, the growing implementation of AI also carries risks. The dark underside of its potential includes, among other dangers, increasing existing gaps -of gender, race, social class, etc.- through the use of biased data, problematic automated decisions, or intrusion into private life (**Brundage** *et al.*, 2018), owing, in part, to the use of partial or outdated data banks for model training or errors in their design, which can cause multiple ethical repercussions (**Dörr**; **Hollnbuchner**, 2017; **Ufarte-Ruiz**; **Calvo-Rubio**; **Murcia-Verdú**, 2021; **Barceló-Ugarte**; **Pérez-Tornero**; **Vila-Fumàs**, 2021; **Deuze**; **Beckett**, 2022), and which European institutions have also begun to address (*European Commission*, 2022a; 2022b).

If we focus on the specific field of the media, automation and AI have developed a multitude of applications in all phases of the information process (**Wu**; **Tandoc**; **Salmon**, 2019; **Marconi**, 2020; **Sánchez-García** *et al.*, 2023) through a varied range of resources, ranging from the use of algorithms for the analysis of consumption habits to the tracking of trends on social networks. This includes the development of tools to identify disinformation (**Ruffo**; **Semeraro**, 2022; **García-Marín**, 2022) or to moderate it in the comments section.

More specifically journalistic uses, on the contrary, are commonly associated with automation and generative AI, i.e., algorithmic processes that convert data into narrative texts and news, with limited or no human intervention beyond the initial programming process (**Carlson**, 2015). Ultimately, their use may involve a redefining of existing models from the communicative perspective of the media, since these technologies can be used as content-generating agents and not as mere mediators of human communication (**Guzman**; **Lewis**, 2020), which may even lead to synthetic media without journalists (**Ufarte-Ruiz**; **Murcia-Verdú**; **Túñez-López**, 2023).

Nor can we ignore the possible problems of job insecurity that the adoption of AI systems may cause for journalists (**López-Jiménez**; **Ouariachi**, 2020; **Stenbom**; **Wiggberg**; **Norlund**, 2021), already greatly accentuated after the successive economic crises since 2008 and other types of job inequality (**Díaz-Noci**, 2023).

Therefore, AI confronts journalism not only with challenges stemming from the adoption of a new technology in its ongoing digital transformation process, but also with issues that affect its intrinsically human nature. Thus, automated models pose new ontological models of relationship between humans and technology (**Primo**; **Zago**, 2015; **Lewis**; **Guzman**; **Schmidt**, 2019) in a profession traditionally characterized by the social and affective impact of the topics covered by the media, as well as of the interpersonal relationships established between journalists, sources, and audiences (**Riedl**, 2019).

In short, the application of AI in the media fuels the debate on how technological advances interrelate with the social dimension of journalism, which Kapuściński summarized in *Il cinico non è adatto a questo mestiere*:

"I believe that, to practice journalism, above all, you have to be a good man, or a good woman: good human beings. Bad people cannot be good journalists. If you are a good person you can try to understand others, their intentions, their faith, their interests, their difficulties, their tragedies, and become immediately, from the very first moment, part of their destiny. This is a quality that in psychology is called empathy. Through empathy one can understand the character of one's interlocutor and naturally and sincerely share the fate and problems of others" ["*Credo che per fare del giornalismo si debba essere innanzi tutto degli uomini buoni, o delle donne buone: dei buoni esseri umani. Le persone cattive non possono essere dei bravi giornalisti. Se si è una buona persona si può tentare di capire gli altri, le loro intenzioni, la loro fede, i loro interessi, le loro difficoltà, le loro tragedie. E diventare immediatamente, fin dal primo momento, parte del loro destino. È una qualità che in psicologia viene chiamata "empatia". Attraverso l'empatia si può capire il carattere del proprio interlocutore e condividere in maniera naturale e sincera il destino e i problemi degli altri.*" (**Kapuscinski**, *2000*)

Indeed, the intimacy of journalists with the emotions and desires of their readers has been one of the most specifically human features of the profession that has been emphasized, as well as its nature as a tool for the development of fundamental rights. Thus, the *Federation of Associations of Journalists of Spain* (*FAPE*), as well as events such as World Press Freedom Day, have claimed during the last few years that "without journalists, there is no journalism" and that "without journalism there is no democracy" (*FAPE*, 2014), a democracy with respect to which the profession has a moral obligation (**Strömbäck**, 2005).

In this context, this article aims to identify the social dimension of the main challenges of journalism in the age of AI and algorithms in relation to three essential aspects: its business and industrial development, the impact on media professionals, and the effects on audiences.

2. AI and journalism

Content automation is not new in the media domain (**García-Orosa**; **Canavilhas**; **Vázquez-Herrero**, 2023); rather, it has been around for at least four decades, albeit with a limited scope thus far (**Lindén**, 2017).

The names it has been referred to within the broader framework offered by the practices of computational journalism and computer-assisted journalism (**Codina**; **Vállez**, 2018; **Parratt-Fernández**; **Mayoral-Sánchez**; **Mera-Fernández**, 2021) have been diverse: "machine-written journalism" (**Van-Dalen**, 2012), "algorithmic journalism" (**Anderson**, 2012), "robotic journalism" (**Clerwall**, 2014), or more commonly, "automated journalism" (**Graefe**, 2016; **Moran**; **Shaikh**, 2022).

In the case of media, talking about AI almost always means talking about automated content, although in reality its applications (**Chan-Olmsted**, 2019), as well as its theoretical developments, have been highly varied, particularly during the last decade (**Parratt-Fernández**; **Mayoral-Sánchez**; **Mera-Fernández**, 2021).

Thus, various media, such as *The New York Times*, *The Washington Post*, or *Le Monde*, and news agencies such as *Reuters* or *Associated Press* (**Fanta**, 2017; **Túñez-López**; **Toural-Bran**; **Cacheiro-Requeijo**, 2018; **Chan-Olmsted**, 2019), have developed initiatives for automated content production, usually in collaboration with technology companies (**Dörr**, 2016; **Lindén**; **Tuulonen**, 2019). These projects have been based on automated text planning, whereby information is created by connecting predetermined templates to databases (**Carlson**, 2015; **Biswal**; **Gouda**, 2020), resulting in texts with more or less repetitive structures (**DalBern**; **Jurno**, 2021).

The ideal areas for the development of this automated content so far have been topics such as weather, financial, or sports information (**Canavilhas**, 2022), for which there are highly structured databases that allow for efficient information extraction to be easily automated (**Graefe**; **Bohlken**, 2020), and where speed prevails over depth in the analysis (**Kim**; **Kim**, 2017). The development of chatbots can also be included in this area (**Lokot**; **Diakopoulos**, 2016; **Jones**; **Jones**, 2019; **Veglis**; **Maniou**, 2019), although their presence and influence in the media have been more limited.

However, the evolution of content automation has gone a step further with the popularization of generative AI systems (for example, *ChatGPT*, *Dall-E*, or *Midjourney*), and various media outlets have openly reported the use of AI in the production of news material on a systematic basis. The debate regarding the real scope of the adoption of this technology -not new, but with a degree of development and implementation never seen before- and whether it is an opportunity or a threat to journalism (**Adami**, 2023), has thus been rekindled.

3. Methodology

For this article, a systematized literature review (**Codina**, 2020) was carried out on the basis of the concepts of "automated journalism" and "robot journalism," as well as their functional synonyms and other related definitions (algorithms, artificial intelligence, etc.) in the field of journalism and media, in both Spanish and English, which complements some previous reviews (**Calvo-Rubio**; **Ufarte-Ruiz**, 2021; **García-Orosa**; **Canavilhas**; **Vázquez-Herrero**, 2023). The period from 2000 to the present was established as the time range. The search was carried out using the main academic databases (*Web of Science*, *Scopus*) and completed using queries in the *Dialnet* directory and the *Google Scholar* search engine.

The results obtained were analyzed and categorized on the basis of quantitative data –the number of references obtained– as well as qualitative data –the topics dealt with on the basis of summaries and keywords– giving priority to empiri-

cal studies dealing with the social dimension of AI, particularly in its generative modality, and the opinions of audiences, professionals, and media managers. Articles dealing exclusively with technical aspects or nonjournalistic uses of AI were excluded. This selection process resulted in a final sample of 223 texts. The resulting texts were analyzed, evaluated, and summarized (**Grant**; **Booth**, 2009) in terms of the impact of AI on the three main subjects of the communicative process: the media, its professionals, and its audiences.

4. Results

4.1. Industrial dimension of news production

Twenty-five years after the emergence of the first cybermedia, the development of digital technologies continues to transform journalistic and news content, a systemic change that has affected the media equally in all the facets of their activity. It has accelerated and expanded the area of information dissemination, transformed its business models, and rethought the relationships between the different actors in the communication process (**Peña-Fernández**; **Lazkano-Arri-llaga**; **García-González**, 2016).

Immersed in the paradigm of the fourth industrial revolution (**Micó**; **Casero-Ripollés**; **García-Orosa**, 2022), information companies advance in the improvement of their production processes in a complex hybrid media system (**Chadwick**, 2013) in which multiple actors create and disseminate content under the growing weight and power of the large technological giants (*Google*, *Meta*, etc.) (**Nielsen**; **Ganter**, 2022).

In this context, the main concerns for media managers in relation to content automation are its commercial viability and the way in which the investment needed to develop it can be acquired, as well as the acceptance that this type of content will have among their readers (**Dörr**, 2015; **Kim**; **Kim**, 2017).

In the face of this new development, **Boczkowski** (2004) points out that it should be taken into account that the media's attitude toward digital transformation has traditionally been reactive, defensive, and pragmatic. In other words, faced with the emergence of technological innovations, the media have imitated what their competitors were doing, protecting themselves from the initiatives of the large telecommunications companies and concerning themselves more with short-term threats than with long-term opportunities.

Some studies published to date have attributed the difficulty of implementing AI in the media to factors linked to investment costs, both for the development of proprietary applications and for the purchase of external tools. The cost of AI development being very high, even for large media (**Broussard** *et al*. 2019), and that not all of them need to develop it to meet their objectives, are also factors.

Similarly, the habitual caution and insularity that usually characterize the implementation of digital transformations in the media (**Beckett**, 2019) are reinforced by the doubts generated around the legal responsibility for the publication of content whose creation is not controlled at all ends, by the diffuse attribution of authorship, or the protection of intellectual property rights (**Montal**; **Reich**, 2017; **Lewis**; **Sanders**; **Carmody**, 2018; **Díaz-Noci**, 2020).

For the media, generative AI enters fully into the struggle for authorship and copyright, where human intervention and content creation are the main assets of journalistic companies in their fight against large platforms in the business of information distribution (**Díaz-Noci**, 2020).

In a profession whose main concern should be citizens (**Lemelshtrich**; **Nordfors**, 2009), content created in an automated way or through generative AI also poses relevant challenges relating to issues such as the creation of content about people, ethics in the use of data, or the transparency of algorithms (**Hansen** *et al.*, 2017; **Riedl**, 2019; **Ventura-Pocino**, 2021; **Pihlajarinne**; **Alén-Savikko**, 2022). These are in addition to those from previous digital transformation processes, such as the risk of polarization or limitations to pluralism that may result from the personalization of content (**Masip**; **Suau**; **Ruiz-Caballero**, 2020).

Finally, at a time when content created wholly or partially through generative AI is approaching exponential growth, expectation management will play a relevant role in the media, as expectations influence the way in which technological developments are perceived by the public and set research priorities that can influence their development and design (**Brennen**; **Howard**; **Nielsen**, 2022). Expectations have a performative character, as they can provide legitimization of technologies even before their success is proven, offer heuristic guidance that can help developers choose a path among existing ones, and provide coordination, mobilizing people and resources to build, design, and extend technologies (**Van-Lente**, 2012).

The management of expectations and promises therefore still has a central role to play in an ecosystem in which automated content creation in the media has been limited and in which there are still no widespread experiences of using generative AI for journalistic content creation.

4.2. Impact on professionals

In an ecosystem in constant transformation, this is not the first time that digital technological development has confronted journalists with the loss of their symbolic capital as mediators between reality and citizens. Without having to go too far back in time, at the dawn of Web 2.0 the rise of citizen journalism already opened the door to an eventual interactive

and connective production in which users and the media coexisted and collaborated, as well as competed, in a joint construction of reality (**Deuze**, 2009). However, despite the existence of isolated "acts of journalism" linked to major events and catastrophes (**Holt**; **Karlsson**, 2014), it soon became clear that audiences were not interested in the sustained creation of journalistic content that competed with the media (**Masip**; **Ruiz-Caballero**; **Suau**, 2019).

The technological development of digital media, far from weakening the corporate sentiment of professionals, has contributed to the strengthening of their identity (**Ferrucci**; **Vos**, 2017). Journalists perceive themselves as an autonomous, self-regulating group (**Andersson**; **Wiik**, 2013) that fulfills a public service function in an impartial and neutral way (**Deuze**, 2005), belongs to organizations that share common goals (**Örnebring**, 2013) and whose task is the production of primary information (**Vos**; **Ferrucci**, 2018), and who consider veracity, contrast, and plurality of sources, as well as the distinction between facts and opinions, as some of the distinctive features of their profession (**Suárez-Villegas**, 2017).

AI once again presents professionals with the eventual loss of part of this symbolic capital and a social questioning that adds to the threat of job loss anticipated by publishers themselves (**Kim**; **Kim**, 2017), aggravated by the latest generative applications (**Elondou** *et al.*, 2023).

Thus, it is not surprising that professionals consider AI and automated content as jeopardizing the integrity of the profession (**Pérez-Dasilva** *et al.*, 2021; **Noain-Sánchez**, 2022). This has perhaps been contributed to, at least in part, by the depiction of replacement raised by the recurrent anthropomorphic image that often illustrates the emergence of "robot journalists" (**Lindén**, 2017; **DalBen**; **Jurno**, 2021), or the limited role attributed to communication professionals in a process conceived from a technocentric vision (**Carlson**, 2014; **Dörr**, 2015).

The importance of professionals' attitudes is not irrelevant, since the digital transformation has shown, among other issues, that the adaptation of innovations in newsrooms, in addition to industrial and economic challenges, has also had to face professionals' lack of training or their resistance to change (**Paulussen**, 2016; **Noain-Sánchez**, 2022). For these reasons, it is important to anticipate not only how technology will alter professional practice, but also the way in which this change is imagined by journalists themselves (**Gynnild**, 2014; **De-Haan** *et al.*, 2022; **Soto-Sanfiel** *et al.*, 2022).

On the contrary, theoretical approaches insist on approaching AI in the media as a set of tools and technologies that can free journalists from performing simple and repetitive tasks, which will allow them to spend more time on tasks that cannot be automated (**Van-Dalen**, 2012; **Young**; **Hermida**; 2015; **Wu**; **Tandoc**; **Salmon**, 2019; **DalBen**; **Jurno**, 2021). This liberation could allow them to add greater complexity and significance to their texts (**Brennen**, 2018) and devote greater dedication to research (**Flew** *et al.*, 2012; **Stray**, 2019) while helping them to overcome some of the current challenges of the profession, such as lack of information, decline in credibility, or crisis in business models (**Ali**; **Hassoun**, 2019). Ultimately, AI could facilitate the return of journalists to the essence of their profession, overcoming the post-Fordist model that limited their role to that of transcribers of facts (**Noain-Sánchez**, 2022).

In the face of deterministic approaches of a more dramatic nature, the challenge for journalists is not to avoid being replaced by disruptive technology, but to discern the way in which the ethical and normative values of the profession can be programmed into the automated generated content, and to find a way in which that content can be integrated into their work (**Diakopoulos**, 2019).

Even the most optimistic statements predict the creation of new jobs in the media associated with the emergence of novel professional profiles, such as the supervision of generated content (**Diakopoulos**, 2019). From this perspective, changes in news production technologies will not simply modify journalistic practices but also introduce what could be considered technologically specific ways of working (**Powers**, 2012), which will require greater collaboration of journalists with technical staff (**De-Lara**; **García-Avilés**; **Arias**, 2022).

This coexistence with a new technology that conditions and complements their work makes it necessary to rethink the professional roles and training needs of journalists. Its evolution will probably be oriented toward more hybrid modes of work (**Deuze**; **Beckett**, 2022), for which it will be necessary to offer new training profiles (**Calvo-Rubio**; **Ufarte-Ruiz**, 2020) in which specifically human traits of the profession, such as curiosity, skepticism, and critical thinking (**Thurman**; **Dörr**; **Kunert**, 2017), will also be deepened.

In any case, journalists show concern about the impact of AI on citizens (**De-Lara**; **García-Avilés**; **Arias**, 2022), and overwhelmingly express their desire to maintain control at all stages of news production (**Wu**; **Tandoc**; **Salmon**, 2019). The ultimate goal of the adoption of AI would be to reinforce the keys to journalistic work, such as creativity, listening, or sourcing (**Guzman**; **Lewis**, 2019).

In the eventual dispute between a competitive relationship and a complementary relationship with AI, journalists do not hesitate to embrace the latter, built on the defense of the cardinal values of the profession.

4.3. A human-centered media AI

However, in the development of automated content, as in all digital transformation processes, audiences will also play a key role. The fluctuation between the more technologically deterministic approaches, which predict a series of automatic effects -whether negative or positive- through the mere provision of technology, and the more constructivist and

integrated approaches, which lead to the way in which the media and its professionals interact with such technologies, cannot refute that any technology that aspires to become an effective innovation requires a process of social appropriation (**Peña-Fernández**; **Lazkano-Arrillaga**; **Larrondo-Ureta**, 2019). Therefore, it is relevant to remember that technological development will not be the only thing driving the implementation of AI in the media (**Van-Dalen**, 2012); rather, social factors such as the acceptance of this content and the way in which its consumption becomes naturalized will also undoubtedly constitute one of the keys to its success.

Existing studies, predating more sophisticated generative AI practices, indicate, on the one hand, that formal emulation is perceived as efficient and that audiences do not find it easy to distinguish content created in an automated way (**Clerwall**, 2014; **Haim**; **Graefe**, 2017; **Graefe** *et al.*, 2018).

On the other hand, the success of the formal emulation that automated content achieves in terms of journalistic standards does not necessarily imply that audiences attribute the same functional authority to such content, since journalism provides not only information but also a way of knowing the world that has accumulated the epistemic authority necessary to be considered legitimate (**Carlson**, 2015).

Therefore, during the last decade, several empirical studies have evaluated automated content according to the three basic criteria for evaluating journalistic texts: the credibility of the source and text, the quality of the information, and the ease and amenity of reading (**Sundar**, 1999), and concluded that the objective style of journalism is a good refuge for automated content. Influenced by the way they are programmed, this content is perceived as more descriptive, objective, and informative (**Clerwall**, 2014; **Lui**; **Wei**, 2019), and is given at least equal credibility to that written by journalists (**Haim**; **Graefe**, 2017; **Melin** *et al.*, 2018; **Graefe** *et al.*, 2018; **Wölker**; **Powell**, 2018; **Zheng**; **Zhong**; **Yang**, 2018; **Liu**; **Wei**, 2019).

For readers, automated information written in an objective style and strictly following the rules of journalistic writing is virtually indistinguishable from that written by journalists. Moreover, the identification of nonhuman authorship does not reduce the credibility of the source itself nor of the content in this type of texts (**Tandoc**; **Yao**; **Wu**, 2020), most likely because of the commitment to impartiality attributed to their technical nature (**Gillespie**, 2014). Some studies even claim that the reception of information is more favorable if its authorship is identified as automated (**Jung** *et al.*, 2017), although such results are not unanimous (**Wadell**, 2018; 2019).

The different perception that readers (**Joris** *et al.*, 2021) have of the content by itself or in knowing its authorship -automated or human- introduces the relevance of the expectations it generates in the acceptance of the content. While the differences in reception are practically nonexistent in the case of more routine information, in the case of nonobjective texts, trust in automated content suffers, and the credibility attributed to them is lower than if they had been written by a journalist. This is probably influenced by "machine heuristics" (**Sundar**, 2008), whereby algorithms are credited with the ability to handle data objectively but are also expected to present results in the same way. Even readers' preconceived image of the depiction of robots in popular culture seems to affect the acceptance of automated content (**Sundar**; **Waddell**; **Jung** 2016).

The interpretation of these studies, however, is not unanimous and is nuanced. In their meta-analysis of research on the impact of automated content on audiences, **Graefe** and **Bohlken** (2020) state that the discrepancies are due to the experimental or descriptive nature of the studies, as the former tend to offer a somewhat more favorable view of human authorship. In any case, all the studies show a high degree of consensus in establishing very small differences in the credibility of automated information and somewhat greater differences in the perception of its quality compared with information produced by journalists.

Faced with similar credibility and a small differential perception of quality, the biggest differences between automated texts and those produced by journalists emerge in the ease with which the information is read. When authored by humans, the information is considered more engaging, enjoyable, and pleasant to read (**Clerwall**, 2014; **Graefe** *et al.*, 2018; **Melin** *et al.*, 2018; **Zheng**; **Zhong**; **Yang**, 2018), as well as eliciting greater emotional involvement than that which is generated in an automated fashion (**Lui**; **Wei**, 2019). Outside the realm of routine news based on objective data, interest in reading automated texts is diminished.

While the evolution of generative AI is expected to narrow this gap in content acceptance, one of the keys will be whether journalists should base their work on repeating existing models that AI already manages to replicate effectively, looking for differentiated styles, or recreating the generated texts on an automated basis.

5. Conclusions and discussion

Before the resounding emergence of generative AI, multiple technical processes developed from this field of computer science have been quietly making their way into media routines during the last five decades (**Beckett**, 2019; **Cools**; **Van-Gorp**; **Opgenhaffen**, 2022), both in support processes and in the automation of editorial content.

Within this general framework of digitization, the application of AI in industrial processes, including in the media, is developing as a top-down process in which institutional priorities coincide with developments led by large technology pla-

tforms. This is an industry-led debate aimed at developing new business models and optimizing existing ones (**Lee** *et al.*, 2019), and which causes discourses to focus more on the capabilities of AI than on the consequences of its adaptation.

However, particularly in fields with a specifically human dimension such as journalism, it is relevant to underscore that AI is not only a technological product, but also a cultural one (**Guzman**; **Lewis**, 2020), and that no technological innovation -no matter how sophisticated- can move us away from our human nature (**Broussard**, 2019). As the father of cybernetics Norbert Wiener stated at the dawn of automation, the key is to consider the machine not as an end in itself, but as "a means to satisfy the demands of man, as a part of the human-mechanical system" (**Guéroult** *et al.*, 1966). Therefore, the first step in the application of AI is understanding it as a set of tools developed by humans in the service of human means and ends (**Broussard** *et al.*, 2019).

Thus, along with the predicted positive effects that can be attributed to its implementation, it is worth emphasizing that AI is a dual-use technology (**Brennen**; **Howard**; **Nielsen**, 2018) that allows for content to be generated in equal measure for malicious purposes, producing new vulnerabilities and risks (**Brundage**, 2018; **Karnouskos**, 2020). In addition, to the extent that they reproduce the real-life patterns in which they have been programmed, algorithms have biases that have been widely studied (**Pihlajarinne**; **Alén-Savikko**, 2022) and may contribute to reinforcing existing social gaps (**Eubanks**, 2017). As **Shilton** (2018) points out, the use of algorithms is deeply political, as they exude the values that their designers and developers have incorporated into them.

The focus in the debate on the application of AI to a specifically human activity such as journalism is therefore not on what the technology is capable of doing, but rather on how it can contribute to achieving its professional and social goals.

First, for the media and the companies that support them, AI can be a tool that contributes to increasing the productive efficiency of tasks that have a high human and organizational cost (**Thurman**; **Lewis**; **Kunert**, 2019). However, the costly implementation of these processes and their development once again stirs the debate about their increasing dependence on large technological platforms (**Danzon-Chambaud**, 2021; **Nielsen**; **Ganter**, 2022; **Simon**, 2022).

Despite new business opportunities (**Lindén**; **Tuulonen**, 2019), such as personalized content (**Møller**, 2022), the high cost of developing these applications and the limited capacity of the media to develop their own tools complicate their position in an ecosystem in which the difference in the technical potential of large and small players is growing. Therefore, one of the decisive challenges for the media will be in managing to enact their own organizational, institutional, and professional values in order not to remain in the hands of large technological platforms (**Diakopoulos**, 2019) in an industry that had found its specific niche in the digital ecosystem precisely with the creation of content. In the face of the impact of AI, one of the challenges will therefore be how the media manages to protect its editorial independence (**Lin**; **Lewis**, 2022; **Van-Drunen**; **Fechner**, 2022).

Early analyses indicate that the implementation of generative AI in media will probably not be as broad and deep as advocated by those who embrace the most enthusiastic and technologically deterministic predictions, but it will certainly offer valuable and relevant examples (**Brennen**; **Howard**; **Nielsen**, 2022). In their implementation, the complex and sometimes contradictory assimilation processes of the novel technical capabilities by the actors in the established social and material structures must be taken into account (**Boczkowski**, 2004). The social appropriation demonstrated through their effective use (**Echeverría**, 2008) will be the indicator of the extent to which they constitute an innovation for the media, a sector whose technological evolution traditionally occurs in a cumulative and nondisruptive way, resorting to external digital applications and systems (**De-Lara** *et al.*, 2015).

It will also be of interest to follow how the masthead under which content is published influences the perception of the quality of automated news (**Liu**; **Wei**, 2019) and therefore the institutional authority attributed to them, as well as the measures taken by the media to ensure transparency in their use.

Second, for journalists and professionals, the implementation of generative AI will again shake up the traditional dispute between editorial and business values, or in other words, the struggle between the commercial and journalistic soul of the media (**Andersson**; **Wiik**, 2013).

In the human appropriation of AI, professionals are the group most reluctant to apply it because of the professional and social undermining they perceive from its eventual widespread implementation (**Kim**; **Kim**, 2018). In any case, despite how AI may eventually constitute more than a simple channel and occupy a role generally attributed to people (**Lewis**; **Guzman**; **Smith**, 2019), this fear of replacement can be relegated to its conception as a set of tools and techniques at the service of journalism.

On the one hand, existing studies show that automated content is already competitive in routine matters, at least in certain highly tasked creation circumstances (**Haim**; **Graefe**, 2017). The automation of part of their tasks, in which human intervention will continue to occupy a relevant role (**Rojas-Torrijos**, 2019), may also be an opportunity to increase the cognitive value of journalistic work (**Túñez-López**; **Toural-Bran**; **Valdiviezo-Abad**, 2019) and escape from more routine and repetitive approaches (**Beckett**, 2019; **Graefe**; **Bohlken**, 2020).

AI provides speed, the ability to manage large volumes of information, verification tools, and personalized and multilingual content, and has already been gradually adopted in multiple news creation and distribution processes (**Wu**; **Tandoc**; **Salmon**, 2019). Faced with the risk of job loss, the entrenched professional ideology (**Deuze**, 2005) and corporate conceptions may have a mitigating effect on the direct impact of technology application (**Lindén**, 2017).

The eventual relief that the application of generative AI would bring to the creation of content of low added value or repetitive nature can put the focus back on more qualitative -and also more intrinsically human- aspects, such as the search for information, the interpretation of facts, creativity, humor, or criticism, i.e., issues that can contribute to improving their work. Journalists do not just write, they think, and journalism is more about asking the right questions than simply writing answers.

Therefore, hybrid or collaborative approaches between AI and journalists are reinforced (**Wadell**, 2018; 2019; **Wu**; **Tandoc**; **Salmon**, 2019; **Tejedor**; **Vila**, 2021), i.e., an integrative or complementary and not substitutive approach in which the relationship of professionals with technological tools will gain a reinforced protagonism in a context with a greater presence of semi-automated content. Content monitoring and error checking (**DalBen**; **Jurno**, 2021), or the development of interpretive and opinionated texts not based on existing data, may be specific roles for journalists, among whom the need for professional control over automated content seems to have become normalized (**Wu**; **Tandoc**; **Salmon**, 2019).

Finally, audiences are perceived as the fundamental element in the appropriation and thus success of AI in media (**Kim**; **Kim**, 2017), and the way in which automated content has been received so far indicates that there is no negative predisposition to its implementation. The perceived credibility of this content is very similar to that attributed to journalists, and the differences in the perceived quality of the texts are also small. Aspects of enjoyableness and readability –particularly in texts written in a nonobjective way- are, so far, the main differential elements in favor of journalists.

It should be noted that the automated texts existing to date have focused on relatively peripheral and highly structured thematic areas associated with reliable databases, such as weather or stock market information. Outside such domains, and particularly in more interpretive texts, it should be noted how advances in generative AI can broaden the acceptability of the produced texts (**Graefe** *et al.*, 2018).

To the extent that AI and data intelligence have the potential to become a regular resource for major content producers and media companies in the industry in the medium and long term, an approach is required that goes beyond the purely technological and addresses challenges such as quality and transparency, respect for privacy, the fight against information disruption or social development.

A change in the focus of the debate is thus encouraged: to not simply talk about what AI is capable of doing, but rather to focus on analyzing how it can affect people and journalists, how it can be used for the proper purposes of the profession and social good, and how to close the gaps that its use can cause (**Broussard** *et al.*, 2019; **Riedl**, 2019; **Deuze**; **Beckett**, 2022).

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Can *ChatGPT* improve communication in hospitals?

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Abstract

Hospitals' use of communication is a crucial aspect of patient care, yet medical material is often hard to read and understand for patients. Issues related to lack of standardization, use of jargon, reliance on outdated technology, poor coordination between health personnel, and shortage of healthcare workers lead to miscommunication, delays, and errors in patient care. By improving communication, hospitals can improve patient care and outcomes, and perhaps lower costs. This opinion piece compares current communication methods with the use of *ChatGPT* technology to explore whether *ChatGPT* can improve the efficiency and accuracy of communication in healthcare settings and, hence, improve patient care. While natural language processing (NLP) tools such as *ChatGPT* and other artificial-intelligence-generated content (AIGC) have tremendous potential to be very useful in healthcare, they should not be solely used as a substitute for humans and should therefore be used with caution.

Keywords

Healthcare communication; Hospitals; Artificial intelligence; *ChatGPT*; Communication; Patients; Doctors; Education; Training; Upskilling; Costs savings; Efficiency; Efficacy.

1. Background

1.1. Health communication in hospitals

Health communication refers to strategies that spread health awareness and data with the goal of helping people better understand the major health risks that threaten their communities (**Mheidly**; **Fares**, 2020). Hospitals, public authorities, patients' associations, and pharmaceutical companies are some of the main organizations implementing health communication initiatives (**Medina-Aguerrebere**; **González-Pacanowski**; **Medina**, 2020). In hospitals, external communication is used to reinforce relations with various stakeholders, especially patients, media companies, and public authorities (**Khosravizadeh** *et al.*, 2021). Hospitals implement integrated communication initiatives, such as corporate events or press conferences (**Elrod**; **Fotenberry**, 2020), as well as develop corporate social responsibility activities to change stakeholders' behaviors towards different social issues, such as diseases or prevention measures (**Jiménez-Correa** *et al.*, 2021).

In addition to external communication initiatives, hospitals engage in internal communication activities to help their employees become brand ambassadors and build the hospital's reputation collectively (**Parker** *et al.*, 2021). Internal communication activities aim to

- integrate employees' perceptions from a medical, social, and human perspective (**Li**; **Xu**, 2020);
- consider cultural elements as key factors determining employees' decisions (**Tan** *et al.*, 2020);
- focus on content that helps employees improve their understanding of the hospital's brand (**Lithopoulos** *et al.*, 2021).

Along with the practice of spreading health awareness and health data through external and internal communication initiatives, hospitals implement training sessions with the main objective to reinforce employees' skills in interpersonal communication (**Butow**; **Hoque**, 2020). These sessions are a means to reinforce, for doctors and nurses, dynamic and engaging relationships with patients and promote ideas such as cooperation, leadership, and collective decision-making (**Rodrigues** *et al.*, 2020).

By implementing external, internal, and interpersonal communication initiatives, hospitals promote health education, reinforce patients' skills in health literacy, and advance the organizations' brand (**Ancker**; **Grossman**; **Benda**, 2020). However, such implementation requires hospitals to develop their own patient education materials, directives, and forms (**Rudd**, 2022), as well as establish consistent plans that include research methodologies, objectives, strategies, messages, and evaluation systems (**Zhao**, 2021). To efficiently achieve their health education goals, these organizations assign a budget for such activities (**Mackert** *et al.*, 2021) and recruit experts able to find synergies among patients' needs, hospitals' health education objectives, and public health authorities' requirements (**Finset** *et al.*, 2020). When hospitals manage health education initiatives in this way, they can efficiently promote their brand.

A hospital's brand includes four main dimensions (**Odoom**; **Narteh**; **Odoom**, 2021):

- brand elements;
- tangible assets;
- employees' quality; and
- medical treatments.

Health education initiatives allow hospitals to reinforce these four dimensions and provide stakeholders with meaningful content (**Gómez-Rico** *et al.*, 2022) that determines their perceptions about the hospital, its employees, and its services (**Rahman**; **Langner**; **Temme**, 2021). Building a reputed, credible brand constitutes a challenge, as well as a priority, for hospitals interested in reinforcing their strategic positionings in the health market (**Medina-Aguerrebere**; **González-Pacanowski**; **Medina**, 2020). These challenges are the reasons why these organizations must prioritize stakeholders' needs in terms of information, health education, and emotional support (**Tsai** *et al.*, 2021).

1.2. Inefficiencies in communication in hospitals

Healthcare professionals' skills in communication play a key role in patients' medical outcomes and knowledge (**Koivisto** *et al.*, 2020). These professionals must use medical terminology, which involves using technical concepts and long explanatory sentences (**Szmuda** *et al.*, 2020), while at the same time implementing the hospital's internal protocols, including corporate language, procedures, and approvals (**Hammoud** *et al.*, 2020). Finally, healthcare workers are required to abide by the organization's ethical requirements, which involve privacy, legal frameworks, and ethical principles (**Morsa**, 2021).

These three aspects (medical terminology, internal protocols, and ethical principles) make doctors' communication often cryptic, inaccessible, hard to read and/or understand, for patients. Consequently, patients struggle to grasp basic

concepts related to public health, treatments, and diseases, which can lead to avoiding reading them, as well as limiting their ability to evaluate and use potentially useful medical information (**Van-den-Broucke**, 2020). To minimize this issue, healthcare professionals try to adapt their communication to patients' medical literacy skills (**Hammoud** e*t al.*, 2020). However, this is not always possible as training for doctors in cultural skills and multidisciplinarity in communication is often insufficient (**Frank** *et al.*, 2021; **Civitelli** *et al.*, 2020). This may lead to misunderstandings, problems for, for instance surgery

> Natural language processing (NLP) tools like *ChatGPT* and other artificial-intelligence-generated content (AIGC) may be very useful in certain healthcare situations by, for example, automating administrative tasks, thus reducing the time that doctors or nurses spend doing non-medical procedures

patients that require structured preoperative education and advice in different formats including brochures, reports, or forms (**Koivisto** *et al.*, 2020). Communication problems also represent a threat to patients suffering from noncommunicable diseases:

- cancer patients need written documents that clearly explain specific concepts such as chemotherapy cycles, side effects, radiation therapy, or surgery (**Tuominen** *et al.*, 2021);
- patients with coronary artery diseases need to receive consistent information about risks, prevention measures and emergency management (**Mentrup** *et al.*, 2020); and
- patients suffering from diabetes need access to documents describing clearly how to control blood sugar or daily frequency of insulin injections (**Soep**; **Agussalim**, 2020).

To improve patient care and reduce issues associated with communication inefficiencies, hospitals have implemented ten initiatives:

1) Help healthcare professionals to adapt their language to patients' needs, and thus improve the readability of educational materials (**Rooney** *et al.*, 2021).

2) Follow evidence-based principles, learning theories, and educational principles in healthcare institutions (**Heng** *et al.*, 2020).

3) Make references to public health authorities' medical guidelines so patients can consult alternative sources of information (**Team** *et al.*, 2020).

4) Implement a human approach that prioritizes patients' needs in terms of information and emotional support (**Tomokawa** *et al.*, 2021).

5) Develop documents that integrate knowledge from other disciplines, such as sociology, anthropology, and education (**Troisoeufs**, 2020).

6) Resort to storytelling techniques to allow healthcare professionals to write more creative texts (**Shruti**; **Govindraju**; **Sriranga**, 2021).

7) Combine written texts with visual elements, such as pictures, figures, or information graphics (**Siregar** *et al.*, 2021).

8) Use videos that complement the written information and help patients to understand some technical concepts (**Lucya**; **Nuryanti**, 2022).

9) Share written documents on different interactive platforms, allowing patients to ask questions to doctors, and upload medical information (**Team** *et al.*, 2020).

10) Integrate written documents, online platforms, and serious games to help some patients, such as children, to understand medical concepts and prevention initiatives (**Sharifzadeh** *et al.*, 2020).

1.3. ICT-mediated communication in hospitals

A significant number of hospitals resort to Information and Communication Technologies (ICT) to improve their relationship with stakeholders. Patient portals, social media platforms, and mobile apps are some of the main technological tools managed by these organizations. According to **Team** *et al.* (2020), hospitals need to improve their dissemination strategies and prioritize patient portals that allow doctors and patients to constantly upskill and share written documents (reports, forms, etc.). Using ICT platforms, healthcare professionals can quickly provide information and monitor patients' medical outcomes (**Shieh** *et al.*, 2020), which positively contributes to reinforcing collective making-decisions processes among patients and doctors (**Adapa** *et al.*, 2020). However, use of these portals introduces challenges to doctors who must write information that adheres to the profession's scientific rigor, allowing patients to make decisions (**Rudd**, 2022), while at the same time, adapting it to different formats available in these portals, such as reports, chats, leaflets, newsletters, or booklets (**Tong** *et al.*, 2021). To efficiently overcome these challenges, hospitals need to train doctors on multidimensional skills (**Farsi**, 2021) and help them to balance medical principles (transparency, ethics, accuracy, patients' rights) and digital health tools (**Barredo-Ibáñez** *et al.*, 2021).

In addition to patient portals, hospitals manage social media platforms to improve doctor-patient communication relations. Several authors, such as **Bora** *et al.* (2021) and **De-Las-Heras-Pedrosa** (2020) have stated that a greater presence

of reliable organizations on social media is necessary so that patients can access accurate medical information. Hospitals should therefore educate medical teams, including doctors and nurses, on written communication skills specific to social media (**Stellefson** *et al.*, 2020). If implemented, trained professionals can develop ten main initiatives on these platforms (**Chen**; **Wang**, 2021):

- promote infoveillance;
- disseminate health information;
- promote health interventions;
- develop social mobilization;
- facilitate health-related research;
- reinforce professional skills;
- facilitate doctor-patient communication;
- share public health-related information;
- exchange social support in online communities; and
- track patients' medical outcomes.

When doctors use social media professionally, they

- enhance patients' right to access quality information (**Alanazi**, 2021);
- improve their relations with different stakeholders (**Katz**; **Nandi**, 2021); and
- help hospitals tackle public health priorities such as combatting misinformation, promoting medical ethics, and reinforcing patients' skills in health literacy (**Comp**; **Dyer**; **Gottlieb**, 2020).

Finally, hospitals develop mobile apps to improve delivery of healthcare knowledge and improve patient satisfaction (**Mateus-Coelho**; **Cruz-Cunha**; **Avila**, 2021). Mobile applications raise patients' knowledge and provide greater access to more written medical information in more convenient and accessible formats (**Palacios-Gálvez** *et al.*, 2021). However, as is true for patient portals and social media, hospitals need to train health professionals on how to use mobile apps to write medical content that patients can efficiently use to make decisions (**Yu** *et al.*, 2021). When properly trained, doctors can use mobile apps to support clinical diagnosis, improve patients' clinical outcomes, promote digital therapeutics, and implement health education initiatives (**Rowland** *et al.*, 2020). Mobile apps can therefore change the way doctors communicate with patients, especially with those facing serious diseases, by sharing written information and care guidance with patients going through surgery (**Machado**; **Turrini**; **Sousa**, 2020); by providing cancer patients' information needs about treatments, and risks (**Lavdaniti**, 2020); and transferring real-time data to patients with diabetes, providing them with tailored recommendations (**Tassone** *et al.*, 2020).

1.4. AI-mediated health communication

The discussion above indicates that hospitals use of communication is often inefficient, and such inefficiencies may lead to a reduction in the quality of healthcare (**Agarwal**; **Sands**; **Díaz-Schneider**, 2010); that is, patient care and outcomes can be compromised. In addition, suggested remedies, such as training doctors and nurses to improve their written communication skills, are potentially very costly. These costs would multiply as more hospitals communicate across several platforms, ranging from patient portals, social media, and mobile applications. Another concern is patient access to healthcare information, which is greater with the use of multiple platforms but adds cost to hospitals. Given that hospitals have limited resources, it is possible that investments into better communication will reduce resources available for other competing ends.

In fact, when discussing health policy researchers and practitioners often refer to the iron triangle of healthcare (**Ball**, 2021; **Terry**, 2017). This iron triangle has three components: access, cost, and quality, and there is an inherent trade-off between the three corners (vertices) (see Figure 1). The implication is that any policy that makes healthcare cheaper (lowering the cost) will either result in a reduction in access or a reduction in quality. Of course, the corollaries are that an increase in quality will either raise costs or reduce access and an increase in access will come at the expense of either cost or quality. Thus, cost innovations must be carefully considered and implemented.
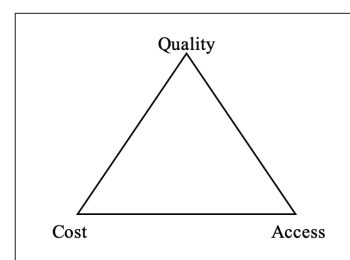
Figure 1. The iron triangle of health care

Another factor is the size of the healthcare industry in almost all countries. In the United States health spending accounted for 18.3 percent of the nation's Gross Domestic Product in 2022; that is, every person in the U.S. spent on average $12,914 on health care annually (*cms.gov*). Although the United States is an outlier, Spain spent 10.7 percent of its GDP on health expenditures in 2020 or €2,538 per inhabitant, which was below average for the European Union (€3,269 per inhabitant in 2020) (*Eurostat*, 2022). In contrast, healthcare expenditure accounts for 8.4 percent of GDP in South Korea (**Kim** *et al.*, 2022). The size and importance of the healthcare industry justifies careful study of the choices that hospitals and governments make to promote the well-being of patients and citizens, respectively.

The healthcare sector is, however, different from other markets, not only because of its size, but also due to uncertainty. That is, consumers of healthcare, as well as producers, cannot accurately predict the demand for healthcare

(**Mwachofi**; **Al-Assaf**, 2011). This uncertainty, combined with people being risk averse, explains the ubiquity of health insurance, whether public or private. In addition, the healthcare market is always looking for ways to reduce uncertainty, in addition to exploring ways to reduce costs. Innovations that can achieve both simultaneously are thus desirable. In fact, **Sampathkumar** (2023) indicated that 3,000 funded digital health startups globally were currently developing AI-based solutions for healthcare problems. Platforms like *Qventus* are for instance reducing costs by improving and optimizing operational processes (e.g., automating discharge planning, scheduling or maximizing the usage of operating rooms). *https://qventus.com*

> *ChatGPT* can be used in healthcare in multiple ways: as a virtual assistant, streamlining care, educating patients, and providing mental health support and guidance

Hence, it is possible that new technologies such as AI chatbots (**Jiang**; **Zhang**; **Pian**, 2022) or Health Recommendation Systems (**Tsai**; **Sandbulte**; **Carroll**, 2022) can in fact break the iron triangle of healthcare by offering better care, better communication, better access, better equity, and even lower costs (**Mahoney**, 2019). Health Recommendation Systems can help patients monitor their health, track their progress, and receive personalized recommendations for their condition. Utilizing AI-mediated health communication could therefore help hospitals save costs by reducing the number of unnecessary consultations, providing more efficient care, and enabling patients to take charge of their health. **Ball** (2021, p. 279) argued that

> "failure to incorporate AI and ML techniques in healthcare may be malpractice".

This study thus explores whether the new *ChatGPT* technology has the potential to achieve these results.

1.5. *ChatGPT*

Today, numerous companies explore and adopt machine learning-based or artificial intelligence-based natural language applications to translate texts, document summaries, or generate abstracts (**Guerrero**; **Liang**; **Alsmadi**, 2022). One of the recent tools launched in this industry is *ChatGPT*, a OpenAI platform designed and trained on a large body of textual data, including newspapers articles, books, and websites, that allows it to answer questions on a wide range of topics and disciplines (*Management and Datascience*, 2023). *ChatGPT* (short for *Chat Generative Pre-Trained Transformer*) is a variant of the *GPT* (*Generative Pre-trained Transformer*) language model that was specifically designed for chatbot applications. With its capabilities in Natural Language Processing (NLP) and its development through large language data sets, *ChatGPT* is said to be able to answer follow-up questions, admit its mistakes, challenge incorrect premises, and reject inappropriate requests (**Jiao** *et al.*, 2023). As such, *ChatGPT* can converse with a human, write codes, compose music, play games, and even write poems and songs. The generative AI quality of *ChatGPT* lends itself to revolutionizing numerous industries and human-computer social interactions (**Gozalo-Brizuela**; **Garrido-Merchan**, 2023). *ChatGPT* acquires its human-like responses through a process of inputs for "reinforcement learning for human feedback," which is said to be developed with human AI trainers (**Gozalo-Brizuela**; **Garrido-Merchan**, 2023, p. 15).

The accuracy of human-like texts of *ChatGPT* not only improves NLP, it also improves natural language understanding (NUL) (**Aljanabi** *et al.*, 2023). This makes it valuable when assisting with social media activities (**Aljanabi** *et al.*, 2023) as it is able to understand language and context (**Gilson** *et al.*, 2022). In addition, its three main advantages are:

- encouraging users' autonomy and improving their learning experiences by offering individualized and interactive help (**Firat**, 2023);
- understanding words in context and making predictions (**Sundar**, 2023); and
- enhancing companies' internal processes (**Fortson**, 2022).

Given the capacities inherent to the *ChatGPT* technology, it can potentially be used in a healthcare in multiple ways, including as a virtual assistant, educating patients and providing clinical support and guidance on medical procedures and protocols. That is, *ChatGPT* can provide written communication material that addresses a variety of patients' needs and questions. In addition, *ChatGPT* answers can be targeted to the level of sophistication of the user.

Based on the *ChatGPT* capabilities, there is real potential for it to lower the cost of healthcare by accomplishing three important goals:

- automating routine tasks (such as appointment scheduling and symptom checker), which would free up healthcare personnel time to focus on more complex tasks (**Baumgartner**, 2023);
- improve efficiency by providing instant access to relevant information to patients across a variety of platforms; and
- reducing errors by providing reliable information at a level that is understandable to the patient. By improving the overall efficiency of healthcare delivery and by freeing up time for healthcare professionals, *ChatGPT* can potentially lower the cost of healthcare.

For similar reasons, *ChatGPT* has the potential to improve the quality of healthcare by providing healthcare providers and patients with accurate, up-to-date information that can reduce the risk of medical errors. In addition, by automating routine tasks, *ChatGPT* can allow healthcare professionals to focus on delivering high-quality care to patients. The

AI platform can also improve the quality of healthcare by improving accessibility to all, but especially to populations that are traditionally underserved due to location. Finally, *ChatGPT* can improve health outcomes and patient care by enhancing communication between patients and healthcare providers, as well as personalizing the provided recommendations and treatment options.

ChatGPT has the potential to break the iron law of healthcare by improving both the quality and efficiency of healthcare delivery; that is, by automating routine tasks, providing accurate, personalized, and up-to-date information, and improving written communication between healthcare providers and patients, *ChatGPT* can reduce the cost of healthcare delivery while also improving the quality of care. Additionally, the use of *ChatGPT* can help reduce the risk of medical errors and improve patient outcomes, which also contribute to lowering healthcare costs. In short, the platform offers a way to simultaneously improve quality, raise access, and reduce costs.

The actual impact of *ChatGPT* on the quality of healthcare will depend on various factors, including the quality of its implementation and adoption of best practices in healthcare delivery. Hospitals will need to adopt a multi-faceted approach that includes the use of technology, along with other innovations in healthcare delivery and policy changes. In addition, despite the advantages and potential advances that *ChatGPT* can provide, it has

> *ChatGPT* provides obvious benefits to a wide range of industries and offers an opportunity to break the iron law of healthcare by improving access, quality of communication, and patient care at scale and at a reduced cost

its limitations. *ChatGPT* raises ethical dilemmas (**O'Connor**, 2022). These often revolve around issues such as who owns the intellectual property of texts produced by this platform, how to cite these texts, or how to evaluate them (**Wenzlaff**; **Spaeth**, 2022). Another concern of *ChatGPT* is the "hallucination effect," which is the potential of the platform to provide seemingly credible but inaccurate responses (**Shen** *et al.*, 2023, p. 3). That is, *ChatGPT* responses can provide wrong answers, wrong or invented references and misinformation can be presented as fact (**Lock**, 2022), which may leave users unable to verify the quality of the information (**Rossoni**, 2022). Similarly, *ChatGPT* focuses on what the user wants to receive, which can provide misleading data, as opposed to providing accurate information based on clarification of questions and given circumstances (**Shen** *et al.*, 2023).

2. The use of *ChatGPT* for health communication

The use of *ChatGPT* for health communication personnel in hospitals has the potential to revolutionize the way in which patients and healthcare providers communicate. *ChatGPT* can be used by health communication specialists to assist with a variety of tasks, such as streamlining administrative tasks, as exemplified by the *Doximity/ChatGPT*-powered platform: *https://www.doximity.com/docs-gpt*

Additionally, *ChatGPT* could be used:

- As a virtual assistant, by providing fast and accurate personalized information on social media platforms on a variety of health topics. The launch of *Visual ChatGPT*, which combines visual foundation models (VFMs) will also enable sending and receiving images based on specific prompts. Alternatively, text-to-video technology could also be used. *D-ID* uses real-time face animation and advanced text-to-speech to create an immersive and human-like conversational AI experience.
  https://www.d-id.com

- As medical triage (symptom management), by helping patients identify symptoms, educate them about their conditions, treatments, and medication, as well as direct them to appropriate medical care based on the urgency of their conditions.
- As mental health support (triage, virtual therapy, mental health education and social support), providing guidance on medical procedures and protocols. It could be used to enroll participants in clinical trials (**Moodley**; **Rennie**, 2023).
- As secretary/personal assistant (appointment scheduling).
- As translator, by providing language translation in real-time, which would facilitate communication between patients and healthcare providers, in various countries.

2.1. Social media and personalized information

As *ChatGPT* has been designed for chatbot applications and generates information based on large bodies of textual data and language modeling, it could be used on a hospital's social media account to provide information about common health conditions, medications, or other health-related topics. It could also be used to answer basic questions about the hospital's services and policies, such as its visiting hours or policies for appointment. Additionally, one of the primary benefits of using *ChatGPT* in hospitals is the ability to provide personalized, accurate, and up-to-date free-of-jargon information to patients. Health communication specialists could technically input specific prompts related to a patient's condition or treatment plan, and *ChatGPT* could generate detailed explanations or instructions in a way that is easy for the patient to understand. As an illustrative example, **Jeblick** *et al.* (2022, p. 2) investigated the quality of radiology reports simplified by *ChatGPT*. Their study concluded that

> "the simplified reports were factually correct, complete, and not potentially harmful to the patient".

Applications such as these can be useful for patients with complex medical conditions, or those who may have limited health literacy. An example a recently launched application *MedPaLM* (*Google Research* and *DeepMind*), an open-sourced large language model for medical purposes (**Singhal** *et al.*, 2022). *AnsibleHealth*, a chronic pulmonary disease clinic, also uses *ChatGPT* to simplify radiology reports for patients (**Mathur**, 2023).
https://www.ansiblehealth.com

2.2. Symptom management and post-treatment engagement

ChatGPT can support patients by helping them identify symptoms and direct them to appropriate medical care based on urgency, as well as providing patients up-to-date information on medical conditions, treatments, and medications (medical information retrieval). In addition to educating patient, *ChatGPT* can also assist with symptom management (supportive psychotherapy, manual-based treatment, etc.). For example, if a patient is experiencing a particular symptom and is unsure how to manage it, a health communication specialist can input a prompt related to the symptom and *ChatGPT* can generate suggestions for self-care or recommend seeking medical attention. This can help to alleviate patient anxiety and ensure that symptoms are properly addressed in a timely manner.

2.3. Mental health support

In addition to physical health support, and equally important, *ChatGPT* can provide accessible mental health support to patients due to its ability to converse with humans. With the ability to provide symptomatic support as well as an increase of educational awareness in healthcare, *ChatGPT* can be used in the following four ways for mental health support:

- Mental health triage: *ChatGPT* can be used to create a chatbot that serves as a mental health triage system. The chatbot could be integrated with platforms such as *Cerebral* or *Done ask users questions* about their mental health symptoms and provide appropriate recommendations for treatment, such as seeking help from a mental health professional or accessing self-help resources. It could also help redirect patients to a doctor/psychiatrist /psychologist / specialist and forward the conversation.
  https://cerebral.com/online/online-adhd-test-diagnosis
  https://www.donefirst.com

- Virtual therapy sessions: *ChatGPT* can be used to provide virtual therapy sessions to users, as a virtual psychologist chatbot. The chatbot could ask users about their concerns and provide support and guidance in a therapeutic way. A recent experiment by *Koko*, an online emotional support chat service based in San Francisco, showed that it is feasible.
  https://www.kokocares.org

  It could also be integrated with a conversational app such as *Alan AI* to keep user engagement.
  https://alan.app

- Mental health education: *ChatGPT*, as a chatbot, could provide specific information and education about, for instance, the signs and symptoms of common mental health conditions, treatment options, and self-care strategies.

- Social support: *ChatGPT* can be used to provide social support to users who may be feeling isolated or lonely. *Ginger*, is an example of a mental wellness and emotional support app that uses machine learning to help patients.
  https://www.ginger.com

  With its natural language processing capabilities, *ChatGPT* could allow real-time conversations with patients in various languages, which is especially important in a hospital setting where time is often of the essence, providing them with the information and support they need to make informed decisions about their health. It can also assist with answering frequently asked questions (FAQs) from patients and their families (e.g., exercise or nutrition plans): *ChefGPT*.
  https://www.chefgpt.xyz

2.4. Appointment scheduling

Another potential use for *ChatGPT* in hospitals is to act as a virtual assistant by supporting with appointment scheduling. Health communication specialists can input prompts related to available appointment times and *ChatGPT* can generate responses to patient inquiries, helping to streamline the scheduling process and reduce the burden on healthcare providers. *Voiceoc* is an example of such use.
https://www.voiceoc.com/conversational-ai/?

Iskowitz (2023) reports for instance on a hospital in the U.S. that was able to optimize its OR block scheduler by 30%. *ChatGPT* can also be used to connect with patients and their families in real-time, providing them with the information and support they need to navigate the often-complex healthcare systems, ultimately improving their overall experience at hospitals.

2.5. Internal communication and training

ChatGPT, in partnership with *WebMD*, the *American Journal of Medicine*, could be used for continuing professional development (CPD), upskilling, re-skilling, and training.
https://www.webmd.com
https://www.amjmed.com

ChatGPT can be trained on specific medical topics and used to provide face-to-face and distance training to healthcare professionals, at all levels, at scale. This can be especially helpful in areas or countries where there is a shortage of specialized healthcare professionals. *Qure. ai* provides automated interpretation of X-rays, CTs and Ultrasounds and could be useful to upskill remote per-

> *ChatGPT* could improve access to and democratization of medical advice and mental health support to those in remote areas, medical deserts, or refugee contexts 24/7 and 365 days/year

sonnel, improve and facilitate collaboration and knowledge sharing among healthcare professionals in different departments or locations. Furthermore, integrated with *Discord* or *Trello* and its AI-generated conversation summaries, it could also be used for administrative purposes, to answer common internal administrative questions such as human resources policies, employee benefits, scheduling questions or synthesize/summarize data-rich lengthy meeting minutes.
https://discord.com
https://trello.com

2.6. *ChatGPT* and cost savings

If *ChatGPT* is implemented in a hospital setting in a way that reduces the need for certain types of labor and supplies, it can potentially lead to cost savings in the form of reduced variable costs. If *ChatGPT* is used to automate certain tasks that are currently performed by hospital staff, it can potentially reduce the need for certain types of labor, such as nurses or receptionists, who are often responsible for facilitating communication, and result in lower payroll costs. Kung *et al.* report on the use of *ChatGPT*

> "to assist with traditionally onerous writing tasks such as composing appeal letters to payors, simplifying radiology reports (and other jargon-dense records) to facilitate patient comprehension, and even to brainstorm and kindle insight when faced with nebulous and diagnostically challenging cases" (**Kung** *et al.*, 2023, p. 10).

Alternatively, it can free up healthcare professionals from routine tasks, both doctors and nurses, and thus allow them to focus on more complex tasks, including more time to engage with patients (*World Health Organization*, 2021). *ChatGPT* can also improve efficiency by providing instant access to relevant information to patients across a variety of platforms, if integrated with *Publer*, which may also reduce costs.
https://publer.io

Finally, *ChatGPT* has the potential to reduce errors by providing reliable information (e.g., potential side effects) at a level that is understandable to the patient. In a hospital setting, effective communication is critical to ensure the safety and quality of patient care. Currently, much of the communication between hospital staff, patients, and other healthcare providers is done in person or over the phone. This can be time-consuming and requires a certain level of staffing and training to support these activities. By improving the overall efficiency of healthcare delivery and by freeing up time for healthcare professionals, *ChatGPT* could thus potentially lower the cost of healthcare.

To this end, the authors of this article propose the following design improvements:

2.7. Potential design improvements

1. Integration with hospital systems: *ChatGPT* could be integrated with hospital electronic medical record systems, allowing it to access patient information and provide more personalized and accurate responses to queries. It could also be used to summarize remote patient monitoring (RPM) data in real time.

2. Customization for healthcare language: *ChatGPT* could be trained on a larger dataset of healthcare-specific language (e.g., *WebMD*), allowing it to better understand and respond to queries related to medical terminology and concepts. It could be combined with the soon-to-be-launched context aware *GrammarlyGo*, which uses organizational, and situational contexts to write professional messages and *Symbl.ai*, which enables live captioning.
https://symbl.ai

3. Support for multiple languages: *ChatGPT* could be designed to better support (and translate in) text-to-speech, speech-to-text, and text-to-images multiple languages, allowing it to be used by a diverse patient population, including those visually/hearing impaired (integrated with the *inSCALE CommCare app* for Malaria detection used in Sub-Saharan Africa for instance), helping reduce language and access barriers in communication, particularly if integrated with *DALL. E2*, *AI Picasso* or *Midjourney* to generate high-resolution medical images.
https://openai.com/product/dall-e-2
https://www.aipicasso.app
https://www.midjourney.com

4. Integration with telemedicine platforms: *ChatGPT* could be integrated with apps or telemedicine platforms such as *Doxy.me*, *Twentyeight Health* or *VSee*, allowing it to assist with virtual consultations and follow-up visits, reducing the need for in-person visits (long/unnecessary commutes) and improving patient access to care.
https://doxy.me/en
https://www.twentyeighthealth.com
https://vsee.com

5. Development of specialized modules: *ChatGPT* could be enhanced with multimodal models (the newly launched *GPT-4*) and specialized modules focused on specific areas of healthcare, such as mental health or chronic disease management, allowing it to provide more targeted and relevant responses to queries.

> There are ethical concerns and risks inherent in the use of *ChatGPT*, around, for instance, confidentiality, the disclosure of private information to third parties, or potential liabilities

6. Natural language processing capabilities: *ChatGPT* could be designed to have improved natural language processing capabilities, allowing it to better understand and respond to queries that are phrased in a more conversational or colloquial style.

7. Integration with other AI tools: *ChatGPT* could be integrated with other AI tools, such as machine learning algorithms, diagnostic apps (such as *Binah.ai*, or natural language generation systems, to provide more sophisticated and personalized responses to queries.
https://www.binah.ai/technology

3. Discussion and conclusions

Overall, the use of *ChatGPT* for health communication personnel in hospitals has the potential to improve patient care and satisfaction by providing personalized (**Haleem**; **Javaid**; **Singh**, 2023), accurate, and up-to-date information and assistance. While there may be some initial investments required to implement *ChatGPT* in hospitals, the long-term benefits are likely to outweigh the costs. That is, *ChatGPT* offers an opportunity to break the iron law of healthcare by improving access and quality of communication and patient care, while at the same time reducing costs of operation. As such, it is worth considering its adoption, possibly in combination with other generative AI tools such as digital human avatars, for instance, or text-to-video creators such as *Synthesia*, *Rephrase Ai*, or *Colossyan* as instruments for health communication personnel in hospitals.
https://www.pantheonlab.ai
https://www.synthesia.io
https://www.rephrase.ai
https://www.colossyan.com

There are however a few potential drawbacks to using *ChatGPT* or NLP tools for health communication in hospitals:

1. Accuracy and accountability: NLP tools rely on patterns in existing text data to generate responses, so they may not always generate accurate or appropriate responses (drug dosages, intolerances, etc.). **Andreou** (2023, p. 13) argued that *ChatGPT*

> "may not be as sensitive nor perceptive to communication signals by patients (i.e., tone, inflection, prosody, fluency, and non-verbal)."

This can lead to misunderstandings, miscommunication, or "catastrophic outcomes" (**Andreou**, 2023, p. 13), which can have serious consequences in a healthcare setting (**Adams**, 2023; **Zhavonrokov**, 2023). **Hegde** *et al.* (2023) and **Doshi** and **Bajaj** (2023) report on experiments to use *ChatGPT* to generate a report on a central nervous system tumor (**Hegde**; **Srinivasan**; **Menon**, 2023) and an authorization letter regarding a transesophageal echocardiogram, not covered by the insurance provider (**Doshi**; **Bajaj**, 2023). Both concluded that, while *ChatGPT* did a "reasonable job" of summarizing content and providing a workable template, referencing of crucial medical literature was lacking.

2. Limited ability to handle complex medical and pharmaceutical terminology: Medical/ pharmaceutical terminology can be complex and challenging to comprehend. While NLP tools can recognize and analyze medical and/or pharmaceutical terminology, they may not be able, yet, to paraphrase, explain, or provide patients with clarifications.

3. Lack of context: NLP tools may not have access to the same contextual information that a human healthcare provider would have, such as a patient's medical history, context, or current condition. This can result in responses that are not tailored to the specific needs or concerns of the patient or inaccuracies in the summary of a clinical consultation.

4. Lack of human interaction (s): While NLP tools can provide patients with information quickly and efficiently, they lack the human interaction, patience, and empathy that are often necessary in healthcare. Patients may feel more comfortable and reassured when they are able to speak with a healthcare professional directly.

5. Ethical concerns:

> "Confidentiality of patient information forms the basis of trust in the doctor-patient relationship. *ChatGPT* threatens this privacy –a risk that vulnerable patients may not fully understand" (**Moodley**; **Rennie**, 2023, p. 10).

There may be ethical concerns about using NLP tools for health communication, around consent issues and confidentiality, particularly if patients are not aware that they are interacting with a machine rather than a human healthcare provider (as in the case of the *Koko* experiment).

6. Bias: NLP tools rely on human input and training and may be susceptible to unintended biases, such as ethnicity, age, creed, gender, and race, therefore providing health advice that is irrelevant or inaccurate.

In conclusion, this opinion piece has argued that, while NLP tools like *ChatGPT* and other AI-generated content (AIGC) may be very useful in certain healthcare situations (**George**; **George**; **Martin**, 2023), by, for example, automating administrative tasks, thus reducing doctors or nurses' time spent doing non-medical procedures (**Baumgartner**, 2023; **Doshi**; **Bajaj**, 2023), as a virtual assistant, streamlining care (**Corder**, 2018), and the po-

' Proposed design improvements include integration with telemedicine diagnostic apps, medical databases, and text-to-speech, speech-to-text, and text-to-images artificial intelligence (AI) generators/creators '

tential to assist with medical education and clinical decision-making (**Shahriar**; **Hayawi**, 2023; **Kung** *et al.*, 2023), they should not be solely used as a substitute for human healthcare providers and should be used with caution in a healthcare setting. Considering the risks with *ChatGPT* around, for instance, the disclosure of private information to third parties or potential liabilities (**Adams**, 2023), health organizations should tread carefully when using it. To minimize these concerns, the *National Health Service* (*NHS* England) is currently working with *OpenAI* and universities to generate synthetic contextual doctor's notes, reducing re-identification to improve privacy: *https://nhsx.github.io/skunkworks/synthetic-data-pipeline*

Although generative AI (GenAI) provides obvious benefits to a wide range of industries (**Vallance**, 2022), allows patients to improve their medical outcomes (**Firth-Butterfield**, 2023), could help disseminate information to patients faster at scale and at a reduced cost, could improve access to and democratization of medical advice and mental health support 24/7 to those in remote areas, medical deserts, or refugee contexts (**Shah**; **Santandreu-Calonge**, 2019) 365 days/year, we argue that this tool cannot, as of yet, entirely replace trained healthcare professionals.

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Spanish technological development of artificial intelligence applied to journalism: companies and tools for documentation, production and distribution of information

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Abstract

Artificial intelligence (AI) has been progressively expanding over the last decade, with its transversal application to the journalistic process and the engaging of media and technology companies in developing specific tools and services. This research offers a first catalogue of Spanish technological companies and institutions that develop AI systems applicable to journalism, with services and features grouped into three phases of the journalistic process: 1. Automated gathering and documentation of information; 2. Automated production of content; and 3. Information distribution and audience relations. The research uses a methodology of in-depth interviews with 45 innovation heads of Spanish-based companies and technological centres specialised in the development of AI (*N* = 25), and is supported by questionnaires to systematise four study categories: company profiles, tools, journalism-specific services and future trends. The results confirm a clear evolution of Spanish technological companies within the AI sector, with services and tools available for the whole journalistic process, mainly in the information gathering and content distribution phases related to monetisation; the automated news production phase is thereby overshadowed. The offering is diversified in terms of formats -textual, audiovisual, sound- and platforms, especially web and social media. The companies consulted testify to the profitability of its implementation and note a growing interest from the media, but warn of an uneven progress that reflects "slowness", "distrust" and "lack of knowledge" regarding the application of AI.

Keywords

Automated journalism; Artificial intelligence; AI; Algorithms; Natural language; Robots; Technology companies; Tools; Software; Applications; Communication; Automation; Newsrooms; Audiences; Information and communication technology; ICT; Journalistic production; Journalistic dissemination.

1. Introduction

Artificial intelligence (from now on AI) has developed very rapidly in recent years, and, although its future is still uncertain, it has the potential to widely and profoundly influence the way news is produced and consumed (**Beckett**, 2019). The term "Artificial Intelligence" was first used in 1956 (**Russell**; **Norvig**, 2022), and since then its definition has evolved in parallel with its application, resulting in different conceptual approaches over the years (**Canavilhas**, 2022). Despite this, the most standardised and widespread definition is that which perceives AI according to its rational action, considering it to be the

> "study of agents that receive percepts of the environment and perform actions" (**Russell**; **Norvig**, 2022, p. 7).

That is, the attempt to understand and build intelligent entities (**Crawford**, 2021), or having computers carry out activities hitherto reserved for the human mind (**Boden**, 2017).

Technology has always been at the foundation of modern journalism, from its beginnings and evolution to the computerisation of newsrooms (**Vázquez-Herrero**; **López-García**; **Irigaray**, 2020). The emergence of new technologies in journalism has transformed the way information is accessed, consumed and interpreted (**De-Lima-Santos**; **Mesquita**, 2021). From this cross-over of technology and the professional practice of journalism has emerged what is known as hi-tech journalism; that is to say, new journalistic specialties and trends have appeared that employ state-of-the-art tools (**López-García**; **Vizoso**, 2021). Thus, in recent years, and especially in the last quarter of a century, the media have been transformed with the new digital era (**Salaverría**, 2019) and its rapidly developing technology, together with the emergence of new tools for the different stages of creating, producing and distributing news (**De-Lima-Santos**; **Ceron**, 2021).

Since the mid-2000s, AI has expanded rapidly in both academia and industry (**Crawford**, 2021), and is one of the fastest developing technologies internationally, growing progressively in different sectors (*Ministerio de Asuntos Económicos y Transformación Digital*, 2020). Therefore, as its use in companies becomes more common, tools and practices become increasingly sophisticated (**Chui** *et al.*, 2021). Its application in the world of journalism has increased interest (**Calvo-Rubio**; **Ufarte-Ruiz**, 2021), and there has been a similar expansion in the international media sphere (**Rojas-Torrijos**, 2021), where research, albeit increasing, is still in the early stages (**Parratt-Fernández**; **Mayoral-Sánchez**; **Mera-Fernández**, 2021). From this cross-over of AI with this sector there emerges what is referred to as "automated journalism" (**Carlson**, 2015; **Caswell**; **Dörr**, 2017), also known as "robot journalism" (**Clerwall**, 2014) or "algorithmic journalism" (**Dörr**, 2015); this involves the automatic writing of news via a computer, with minimal or no human input (**Wu**; **Tandoc**; **Salmon**, 2018), by applying Natural Language Generation (NLG) techniques (**Montal**; **Reich**, 2017).

This emerging reality is not limited to news production, but occupies all stages of the production chain (**Diakopoulos**, 2019), that is, gathering, storing, processing, transmitting and consuming information (**Túñez-López**; **Fieiras-Ceide**; **Vaz-Álvarez**, 2021); this signifies a wholesale transformation of the journalistic process (**Rojas-Torrijos**, 2021).

The first applications of automated journalism were in the United States in 2014 –with the creation of *Quakebot*, to automatically report earthquakes– in *Los Angeles Times* (**Carlson**, 2015), and in *The Associated Press* reports on the *Automated Insights' Wordsmith* platform (**Graefe**, 2016), which also automatically writes sports articles (**Tejedor-Calvo** *et al.*, 2021). The same year, the French newspaper *Le Monde* used the *Data2Content* AI system to generate micro-news on election results (**Sánchez-Gonzales**; **Sánchez-González**, 2017).

During the last decade, the application of AI to news writing extended to news agencies (**Fanta**, 2017) and media from different countries in North America or Europe; such as *Forbes*, *Yahoo!*, *Thomson Reuters*, *ProPublica*, *Sports Illustrated*, *The Washington Post* or *The New York Times* in the United States; *BBC*, *The Guardian* or *The Telegraph* in the United Kingdom; *Der Spiegel* or *Berliner Morgenpost* in Germany and various European agencies; in Asian countries, with *South China Morning Post* or *The Shinano Mainichi Shimbun* in Japan; or in Latin America, such as *El Financiero* in Mexico or the Brazilian television *Globo* (**Túñez-López**; **Toural-Bran**; **Cacheiro-Requeijo**, 2018; **Essenfelder** *et al.*, 2019; **Firat**, 2019; **Rojas-Torrijos**, 2019; **Ufarte-Ruiz**; **Manfredi-Sánchez**, 2019). Specialiseded companies such as *Narrative Science*,

Automated Insights, *Yseop* and *CBS Interactive* have also emerged with GLN systems for writing journalistic texts (**Van-der-Kaa**; **Krahmer**, 2014).

In the Spanish case, there are pioneering projects such as

- *Medusa*, from *Vocento*, which experiments with automated journalism to generate information on the situation of beaches and ski slopes (**Ufarte-Ruiz**; **Manfredi-Sánchez**, 2019);
- *El Confidencial's bot*, *AnaFut*, for the automatic writing of sports reports (**Rojas-Torrijos**; **Toural-Bran**, 2019); or
- *Gabriele software* created by the *Narrativa* start-up, to write journalistic texts automatically, and which collaborates with various Spanish media (**Ufarte-Ruiz**; **Manfredi-Sánchez**, 2019).

Other successful examples are *Agencia EFE*, which, together with *RTVE*, uses AI in database analysis, as well as other projects focused on news writing (**Bazán-Gil** *et al.*, 2021), and two intelligent news alert systems, *Dataminr* and *Social Media Radar* (**Tejedor-Calvo** *et al.*, 2021). In the case of political information, the *Politibot* project, a pioneering chatbot promoted by *El Español*, is a leading example (**Sánchez-Gonzales**; **Sánchez-González**, 2020).

The application of AI therefore extends to mass media, news agencies and service-generating companies, playing a fundamental role in journalistic workflows (**Barceló-Ugarte**; **Pérez-Tornero**; **Vila-Fumàs**, 2021). Its implementation in newsrooms is still considered to be in its early stages (**Graefe**; **Bohlken**, 2020), but it has begun to arouse business interest as regards seeking profitability and new business models (**Caswell**; **Dörr**, 2017). This initiative is also driven by non-journalistic agents (**Carlson**, 2014), since very often this technological disruption does not come directly from the media, but from external companies (**Salaverría**; **De-Lima-Santos**, 2020).

If, since its origins, technology has always influenced, limited and structured journalism (**Pavlik**, 1999), it is now more essential than ever in order to deal with the relentless expansion of AI in the communication sector. In an apparently slow and irregular evolution of the Spanish media towards automation, the academic environment has focused on an analysis that, albeit incipient, makes it possible to outline the situation by means of meta-research in the area of Communication (**Martínez-Nicolás**; **Saperas-Lapiedra**, 2011); this examines how the issue is investigated, from a definition of the problem, the search for information, organisation and analysis (**Gómez-Luna** *et al.*, 2014).

An approximate review of the state of the art in Spain, concerning fifty Communication journals –following the model of **Sánchez-García** *et al.* (2019)–, corroborates the initial academic interest in this country (**Parratt-Fernández**; **Mayoral-Sánchez**; **Mera-Fernández**, 2021). This involves a wide sample of 188 AI studies; of these, 42 articles published in just over five years focus on the application of AI in the media, with 28 offering examples of AI tools applied to media and focusing mainly on three approaches:

- The state of the newspaper industry, especially as regards perception by professionals, changes in the sector, and the creation of AI application maps in the media (**Salazar-García**, 2018; **López-García**, 2018; **López-García**; **Rodríguez-Vázquez**; **Toural-Bran**, 2019; **Tejedor-Calvo** *et al*., 2021; **Túñez-López**; **Fieiras-Ceide**; **Vaz-Álvarez**, 2021; **Túñez-López**; **Toural-Bran**; **Cacheiro-Requeijo**, 2018; **Túñez-López**; **Toural-Bran**; **Valdiviezo-Abad**, 2019; **Ufarte-Ruiz**; **Calvo-Rubio**; **Murcia-Verdú**, 2021).
- Case studies of the applications, with the clear predominance of chatbots and tools to combat misinformation, and several examples of news automation (**Bazán-Gil** *et al.*, 2021; **Flores-Vivar**, 2020; **Gómez-de-Ágreda**; **Feijóo**; **Salazar-García**, 2021; **Herrero-Diz**; **Varona-Aramburu**, 2018; **Cerdán-Martínez**; **García-Guardia**; **Padilla-Castillo**, 2020; **Rojas-Torrijos**, 2019; **Rojas-Torrijos**; **Toural-Bran**, 2019; **Sánchez-Gonzales**; **Sánchez-González**, 2017; 2020; **Segarra-Saavedra**; **Cristófol**; **Martínez-Sala**, 2019; **Ufarte-Ruiz**; **Manfredi-Sánchez**, 2019).
- An analysis of academic interest, such as training in AI offered in Spanish universities and the perception of teachers, as well as scientific literature in this area (**Calvo-Rubio**; **Ufarte-Ruiz**, 2020; 2021; **Lope-Salvador**; **Mamaqi**; **Vidal-Bordes**, 2020; **Parratt-Fernández**; **Mayoral-Sánchez**; **Mera-Fernández**, 2021; **Ufarte-Ruiz**; **Fieiras-Ceide**; **Túñez-López**, 2020; **Ufarte-Ruiz**; **Murcia-Verdú**, 2018).

This review of state-of-the-art technology accounts for the delimitation of our study to the unexplored perspective of technology companies that develop AI tools for the media, for which there are no prior studies or an official registry in Spain. This is confirmed by a report from the *Ministry of Economic Affairs and Digital Transformation* regarding a previous consultation for this article: "As of today there is no registry of Artificial Intelligence companies" (e-mail communication, February 9, 2022).

The study has a threefold research and transfer objective:

O1. To locate the available technology for AI applicable to journalism that has been developed by technology companies and research centres based in Spain, whilst ascertaining the professional profile of their teams and their synergies between the Information and Engineering areas.

O2. To produce and publish the first catalogue of multiplatform Spanish AI tools and services for the different stages of documentation, production, and distribution of information.

O3. To solicit the opinion of companies and technological centres regarding the profitability of applying AI and its practical use by the Spanish media.

The research is based on the hypothesis that in Spain automated technological tools and services with AI applicable to different stages of journalism are available, but their implementation among the media is a slow one.

2. Materials and methods

The methodology employed in the study is based on in-depth interviews with heads of innovation departments in Spanish-based technology companies and research centres specialised in Artificial Intelligence, and with applications in the media. This is subsequently combined with a questionnaire, making it possible to systematise some of the answers from the interviews and integrating both techniques with the same objectives (**Thelwall**, 2006); these complement each other and provide a multi-reference perspective of a complex topic (**Martínez-Rodríguez**; **Benítez-Corona**, 2020).

2.1. Sample: technology companies and participating representatives

The lack of official records for companies that develop AI technologies applicable to journalism and means of communication has meant that the fieldwork was preceded by a complex search phase for such companies. Thus, samples have been obtained from initial contacts through previous consultation with media that already apply these technologies; this initiates a "snowballing" process (**Noy**, 2008) as a qualitative technique (**Cohen**; **Arieli**, 2011), in which the researcher's first contacts recommend others for participation, thereby increasing this initial sample (**Parker**; **Scott**; **Geddes**, 2019). This represents a cumulative, diachronic, and dynamic process (**Noy**, 2008), which is recommended in exploratory research (**Atkinson**; **Flint**, 2001) and when the sample is "small, limited and difficult to find" (**Sánchez-García**; **Redondo**; **Diez-Gracia**, 2021, p. 46); this also gives it value in itself, even if it is an approximation of existing research.

The list of technology companies developing AI for the media, together with their catalogue of services and tools, is given here as a contribution to future studies. Therefore, it is appropriate to provide details of the selection procedure employed by these companies, the time frame of the interviews and questionnaires, and those responsible for participating. To obtain the sample, 28 companies and technological development centres were initially contacted; after the discarding of those which either failed to respond or were unsuitable for the object of study in view of their inapplicability to the media, a final sample limited to N=25 was chosen.

Data collection for the whole process was carried out between May 2021 and February 2022 –with a remarkable willingness and agility of response from the companies– via three contact channels:

- Contacts via media operating with AI tools: consultations took place via email and/or video call conversations with technological development representatives of the Spanish media or media groups such as *Prisa*, *RTVE*, *Muy Interesante* and *Vocento*. This phase allowed direct contact with technology companies that already work with the media or that have tools under development.
- Information obtained by means of tracking company websites, and especially the social network *LinkedIn*, by using its search engine with the keyword IA –in both its Spanish and English versions.
- The "snowballing" method, which is applied by interviewing company representatives included in the sample and requesting from them successive contacts from companies in the sector.

Once the companies had been located, a first contact e-mail was sent to them to arrange a video call interview with the person responsible for technological development chosen by the company. The conversations and interviews that were carried out involved a total of 45 representatives of different technology departments (Table 1).

2.2. Interviews and questionnaire

In the dual methodology employed the interview and questionnaire were complementary. First, the semi-structured interviews addressed to the representatives of the technology companies included questions which involved a non-directional and flexible approach, providing an overview of the object of study (**Taylor**; **Bogdan**, 1987) around three initial axes:

- main activity of the company;
- services and tools applicable to journalistic processes; origin and professional profiles;
- opinion regarding the evolution and innovation of AI in the media.

Subsequently, the questionnaire was used as part of the survey methodology (**Tafur**, 2020), addressed to the same companies and entities interviewed by means of a self-administered form sent by e-mail and answered by one or more of those responsible in each case. These were open-ended, multiple-choice and exploratory questions, an effective technique when seeking information without knowing all the answers (**Amérigo**, 1993; **García-Alcaraz** *et al.*, 2006) and one which has proven useful in previous studies with software developers (**Gómez-García** *et al.*, 2019) and experts in new technologies (**Rojas-Torrijos**; **Toural-Bran**, 2019). Eighteen questions were asked to expand and facilitate standardisation of previous interviews into four categories[1] that included analysis variables established in the research objectives:

- A description of the company or entity (C1). This included contact details, where and when it was founded, as well as the company's service and core sector.
- The development of AI tools (C2). Information was obtained regarding the activity and the main product or service of the technology company in connection with the study.
- The application of AI to Journalism (C3). This category focused on the type of technology developed by the companies surveyed and its specific application to the media. This represented a description of the tools or services developed, as

Table 1. Sample of interviewed technology companies and centres*

Company/centre	Participants / Position	Date
Airtouchmedia *https://www.airtouchmedia.com*	Armando Avila Kramis / CEO	18-11-21
Citius *https://citius.gal*	José María Alonso Moral; José Alberto Bugarin Diz; Pablo Gamallo Otero; Félix Díaz Hermida / Researchers	18-11-21
Dail Software *https://www.dail.es*	Jesús Cardeñosa / Founder of the *Instituto de Generación de Conocimiento*	28-07-21
Echobox *https://www.echobox.com*	Antoine Amann / CEO	10-01-22
Gamco *https://gamco.es/*	Roberto Galiana Giner / Business development	25-02-22
Graphext *https://www.graphext.com*	Brais Ramos / Head of Sales Victoriano Izquierdo / Co-founder and CEO	21-12-21
Hiberus *https://www.hiberus.com*	David Torres / Head of resources Mariano Minoli / Head of AI and data	03-02-22
Intelygenz *https://intelygenz.com*	José María Fernández / Head of R+D	15-10-22
Instituto de Ingeniería del Conocimiento *https://www.iic.uam.es/iic*	Guillaume Pivetta / Business development: Social Business Analytics	30-06-21
Knowledge Reuse *http://www.kr.inf.uc3m.es*	José María Álvarez Rodríguez / Teacher UCM Juan Llorens / Teacher: Systems Engineering	02-02-22
Lurtis *https://lurtis.com*	Luis Penya / CEO	13-12-21
Monoceros.Labs *https://monoceros.xyz*	Carlos Muñoz-Romero / CEO Nieves Ábalos Serrano / Co-founder and CPO	23-07-22
Narrativa *https://www.narrativa.com*	David Llorente / CEO Sofía Sánchez González / PR y Marketing	21-10-21
Newtral *https://www.newtral.es*	Marilín Gonzalo / Head of digital area Rubén Míguez / Head of technological development	17-12-21
OdiseIA *https://www.odiseia.org*	Richard Benjamins / Chief AI & Data Strategist David Corral / Head of *RTVE Innovation*	19-11-21
Optiva Media *https://www.optivamedia.com*	Iñaki Martínez Sarriegui / Head of R&I Joaquin M. López Muñoz / Product Management Sandra Grano de Oro / R+D promoter	06-07-21
Paradigma *https://www.paradigmadigital.com*	Antonio Trullás / Head of growth area Andrés Macarrilla / Tech Lead Tomás Calleja Valls / Cloud architect Patricia Prieto Longareda / Solutions Architect	19-01-22
PiperLab *https://piperlab.es*	Nacho Abad López / Business development Alejandro Llorente Pinto / Data Scientist	21-02-22
Prodigioso Volcán *https://www.prodigiosovolcan.com*	José Carlos Sánchez / Head of AI Carmen Torrijos / Computational Linguist	03-12-21
Sherpa *https://www.sherpa.ai*	Celestino García / Vice-president	18-03-22
Sngular *https://www.sngular.com*	José Luis Calvo Salanova / AI Director	13-12-21
Tools *https://toools.es*	Mario Ramírez Ferrero / Information Security Lead	22-10-21
Vass *https://www.fundacionvass.org*	Antonio Rueda Guglieri / Director Carlos Antón García / Manager with AI models Oliver Sanz Gallego / Natural Language	05-11-21
Voikers *https://voikers.com*	Roberto Carreras / CEO	21-10-21
Webedia *https://es.webedia-group.com*	Roberto Jiménez / Chief Editor Alberto Gago / PR Marketing Manager	24-01-22

* The companies and centres making up the sample are presented in alphabetical order. Following initial contact by email, semi-structured interviews were conducted via video-calls, and subsequently a questionnaire was sent out except in two cases: *Echobox*, from which the written response was obtained in English by e-mail, and *Sherpa*, with which an initial interview with those responsible could not be completed, the information being collected instead via mail, the *Prisa* group and the web.

well as the professional profile involved; whether they had hybrid teams and media experts; their design and rollout period; whether it was an in-house or external assignment; whether they could be extrapolated to projects other than the media; and whether their interface was developed at user level or if they needed specialised professionals to operate it.
- The AI tool or service offered and its usability in Communication (C4). Information was gathered on the tool offered on the market, whether or not it was multiplatform; its main function; its classification according to the proposed taxonomy (Information/Production/Distribution); the devices it was intended for; whether or not it was profitable for the company and the media; and the interest of the latter in developing these types of applications and tools.

The interviews and questionnaires were instrumental in formulating an approximate catalogue of AI technology already available for application, and in making a distinction between three possible automation stages of the journalistic process in accordance with previous studies; these are explained below and simplified in Table 2.
- Phase 1. Automation of information gathering (reporting). This includes the process of documentation, information search, trends, and informative topics, with a prior analysis of numerical, textual and audiovisual databases, completing the stages of documentation, contextualization and previous reports or infographics. This stage has been applied since the 1990s to the economic or meteorological area (**Graefe**, 2016; **Dörr**, 2015; **Linden**, 2017), and has expanded to other phases of the informative process (**Nakov** et al., 2021) such as verification.
- Phase 2. Automated content-information production (production). Writing and creating content. This level, which is more complex than the previous one, is capable of generating news (**Ufarte-Ruiz**; **Manfredi-Sánchez**, 2019; **Ufarte-Ruiz**; **Fieiras-Ceide**; **Túñez-López**, 2020) for all types of formats and platforms. It also includes the visualisation and final production of data graphics and infographics.
- Phase 3. Distribution of information and relationship with the audience (distribution). Dissemination of information content and reception analysis. It encompasses selecting the content based on algorithmic prediction and applying machine learning with recommender systems that personalize reception (**Robles-Morales**; **Córdoba-Hernández**, 2019; **Kotras**, 2020; **DeVito**; **Gergle**; **Birnholtz**, 2017; **Saranya**; **Sadhasivam**, 2012). It is based on information and consumption data gathered on the web and social networks, including sentiment analysis; this makes it possible to improve the company's efficiency in subscription and monetisation. This dynamic

> "not only increases visit frequency, which increases revenue through advertising, but also improves engagement" (**Zihayat** *et al.*, 2018, p. 15).

This phases three, includes the creation of informative chatbots that enhance the journalistic narrative to enrich the account, collect information about the audience or disseminate content with the automated sending out of newsletters (**Veglis**; **Maniou**, 2019).

Table 2. Stages of applying artificial intelligence to journalism

Stage 1. Automated gathering of information and documentation (*reporting*)   Search for documentation, context and data, extracting, classifying and verifying content prior to generating information
Textual, audiovisual, web data and social network analysis: field search, documentation, reports, infographics and verification of sources or topics
Stage 2. Automated content-information production (*production*)   Drafting information and generating content with different formats and platforms
Textual news, audiovisuals, audios, infographics
Stage 3. Distribution of information and audience relations (*distribution*)   Automated information and content dissemination for greater personalised recommendation and reception analysis on platforms and networks
Content curation, newsletters, information and personalisation recommenders, chatbots and wizards, audience data analysis on the web and networks, sentiment analysis, subscription-monetisation, post-informative verification

Source: based on *Prodigioso Volcán* (2020).

3. Results

The research on the technology companies and research centres consulted has enabled us to outline an unprecedented approximation of the Spanish "technological muscle" that develops services or tools applicable to automated journalism. The results make it possible to meet the objectives of analysing the technology available and presenting a first catalogue and business profile of AI services applicable to journalism; this is complemented with the opinion of experts on its evolution in the sphere of the media. The combined quantitative and qualitative data obtained from the interviews and questionnaires are combined in order to provide an understanding of the results.

> 'The implementation of AI in newsrooms is still in its early stage, but it has begun to arouse business interest linked to profitability and new business models'

3.1. Catalogue of Spanish technology companies developing AI for the media

The Communication sector in Spain has begun to incorporate AI in the last decade, and this has increased particularly in the last five years. As a result, it has aroused the interest of technology companies in terms of developing specific services and tools for the sector, even before these are requested by the media. From the interviews conducted, it is clear

that most of the companies specialising in AI and data analysis diversify their efforts in different strategic economic sectors (especially, banking, insurance, healthcare, transportation, etc.), and have services they consider equally applicable to the communications sector (Table 3); in some cases, these are start-ups created by and for the newspaper industry. Below is the first catalogue of companies developing AI in Spain. This should be considered a non-definitive and original approximation, since there are no similar records that can serve as a reference for the media.

The catalogue includes two sections: a specific service or tool available to the media – some with a commercial name and others without – together with a description of its main features, which are then grouped in the authors' taxonomy (Graph 4).

Table 3. Catalogue of technology companies with AI applications in journalism, tools, and features*

Company/centre	Tools, services and clients	Main features
Airtouchmedia *https://www.airtouchmedia.com*	AI Consulting (*Alexa*)	Subscriber support, e-commerce and audience data
		Design of virtual wizards and chatbots
Citius *https://citius.gal*	*Linguakit*	Linguistic analysis and data extraction, interactive dialogues and sentiment analysis
		Automatic generation of previous reports
Dail Software *https://www.dail.es*	*Leo Robot* *Full Tak* *Agora* *Datability*	Automatic news production
		Intelligent chatbots, linguistic analysis and e-commerce
		Active audience listening on social networks
		Extracts company information and audience analysis
Echobox[2] *https://www.echobox.com*	*Echobox newsletters* and *Social* (*El País, La Razón, RTVE, El Español*)	Automation of publications distribution
Gamco *https://gamco.es*	*Cates* (semantic categorisation)	Text classification, labelling and personalising of viral topics and trends for the journalist
Graphext *https://www.graphext.com*	*Graphext*	Complex data analysis
Hiberus *https://www.hiberus.com*	*SAC* (*Subscription accelerator content*) (*Diario de Navarra, Henneo; La vanguardia, 20 minutos*)	Monitoring of reader-subscriber behaviour Automatic learning; semantic analysis; monetisation
		Application of AI to internal content managers
Intelygenz *https://intelygenz.com*	*Konstellation* *graf+IA* (*Prodigioso Volcán*)	Content recommender / personalisation AI for APPs, graphics, document search
		Production of infographics
Instituto de Ingeniería del Conocimiento *https://www.iic.uam.es/iic*	*Lynguo*	Sentiment analysis, personalisation of content
Knowledge Reuse *http://www.kr.inf.uc3m.es* (*Universidad Carlos III*)	*Social Media Radar* automated information generation (*RTVE*)	Active listening of social networks for journalists: topic, audiences and sentiment analysis
		Automated news generation
Lurtis *https://lurtis.com*	Data and linguistic analysis	Digital consultancy for implementing AI
		Recommender systems and customer profiling
		Text analysis for real-time alerts
Monoceros.labs *https://monoceros.xyz*	*Monoceros*	Voice wizards and chatbots
Narrativa *https://www.narrativa.com*	*Gabriele* (*El Confidencial, Sport, El Español, El Periódico, El Independiente, RTVE*)	Generating news content text
Newtral *https://www.newtral.es*	Claimbot (*WhatsApp*) Claimhunter (networks)	News fact-checking
		Filtering of verification queries via *WhatsApp*
		Analysis of political discourse on *Twitter*
		Audiovisual discourse analysis
OdiseIA[3] *https://www.odiseia.org*	AI ethical analysis	Algorithm ethics analysis and dissemination
Optiva Media *https://www.optivamedia.com*	*MediaWatcher*	Analysis of the level of social responsibility of audiovisual media algorithms
Paradigma *https://www.paradigmadigital.com*	*Tailorcast*	Podcast recommenders
		Audience data analysis
		Digital consultancy for implementing AI

Company/centre	Tools, services and clients	Main features
PiperLab *https://piperlab.es*	Audience analysis (*Prisa, Vocento, El Economista*)	Audience segmentation / personalisation
		Analysis of content distribution on networks and comparison with competitors' audiences
Prodigioso Volcán *https://www.prodigiosovolcan.com*	*Clara* *graf+IA*	Digital consultancy for implementing AI
		Linguistic analysis via machine learning
		Development of automated infographics
Sherpa *https://www.sherpa.ai*	AI Consulting / user privacy (*El País*)	Improvement in publicity ROI
		Increased customer satisfaction
		Content recommendation engine
		Enhanced engagement and CTAs
Sngular *https://www.sngular.com*	Wizards (*Prisa Radio-Alexa*)	Digital consulting and software development
		Chatbot for employees
		Social media sentiment analysis
		Automated image and video tagging
		News recommenders
		Wizards
Tools *https://toools.es*	*OTTforyou*	Curation, audience segmentation, recommender, data verification and validation
		On-demand digital technology consulting
Vass *https://www.fundacionvass.org*	*Herramienta KL 30* *Smok*	Content Accelerator with internal documentary dictionary to enhance news
		Content personalisation, social login
Voikers *https://voikers.com*	Audio player	Voice wizards
		Automated news reading
Webedia *https://es.webedia-group.com*	Analysis of topics and audiences	AI in digital entertainment: topics, trends, and audiences for strategy recommendation

The interviews and the systematised responses via questionnaires made it possible to obtain the results set out in the objectives described below. Regarding the profile of the companies (O1), it was found that in Spain there is a relatively recent AI technology network, and that this has expanded, principally in the form of start-ups, in the last decade; most are based in Madrid (78.26%) and are focused on different development sectors. Two types of profiles can be distinguished: those that represent the whole company, and those that comprise the specific development team for the AI tools offered to the media (Graph 1).
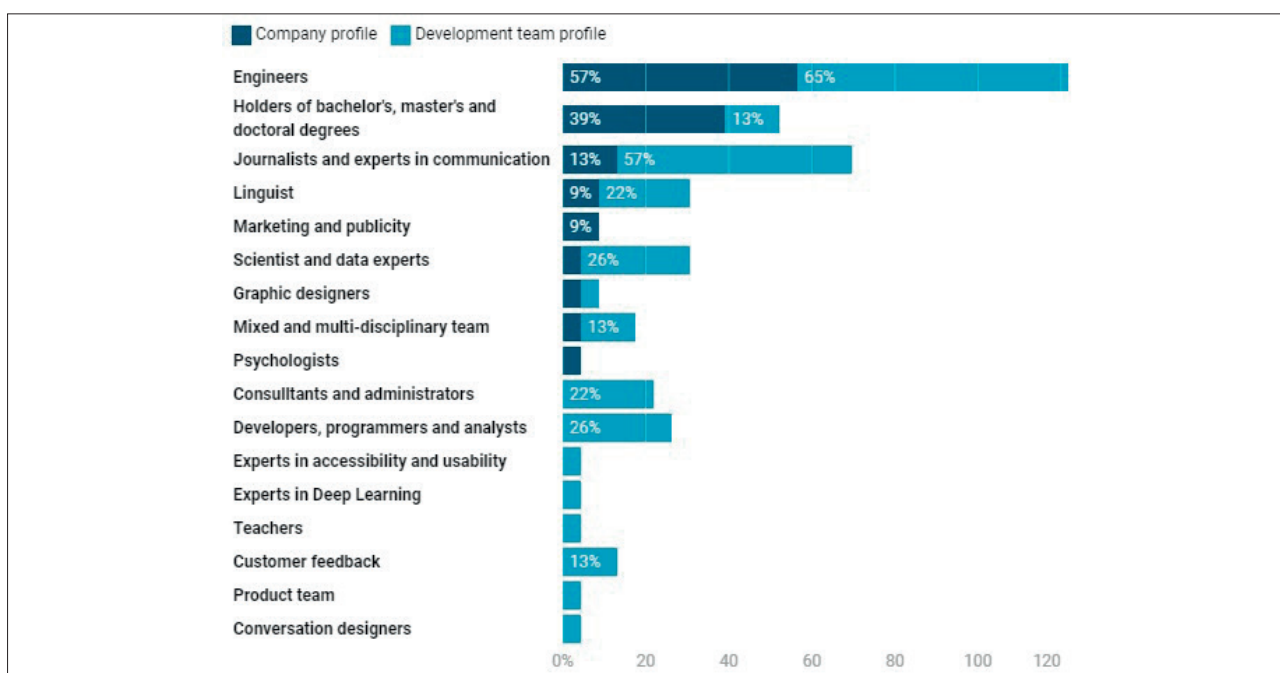
Graph 1. Professional profile of the companies and teams developing AI tools

In both cases, the integrated technical profiles focus on Telecommunications or Computer Engineering, among other specialities. The tools applicable to the media are designed with the collaboration of experts in Communication and Marketing, and business consultants or computational linguists, with the adaptation of the team to development needs. In this regard, profiles in engineering (65.21%) and journalism (56.52%) predominate, with a greater presence in the development of tools than in the general profile of the companies (13.04%).

With respect to AI application platforms (Graph 2), the companies confirmed that the tools and services are developed on their own initiative (60.86%) for subsequent supply to the media, while a minority (21.73%) are applications commissioned by the media. Likewise, they are aimed at a multiplatform market, with application in web environments (95.65%), tablets and smartphones (56.52%), technological wizards (34.78%) and audio (26.08%) or audiovisual (21.73%) aids. The interface has a user-level design (69.16%) and can be employed without prior knowledge or with basic learning (8.69%), a specialised professional being required in very few cases (4.34%).
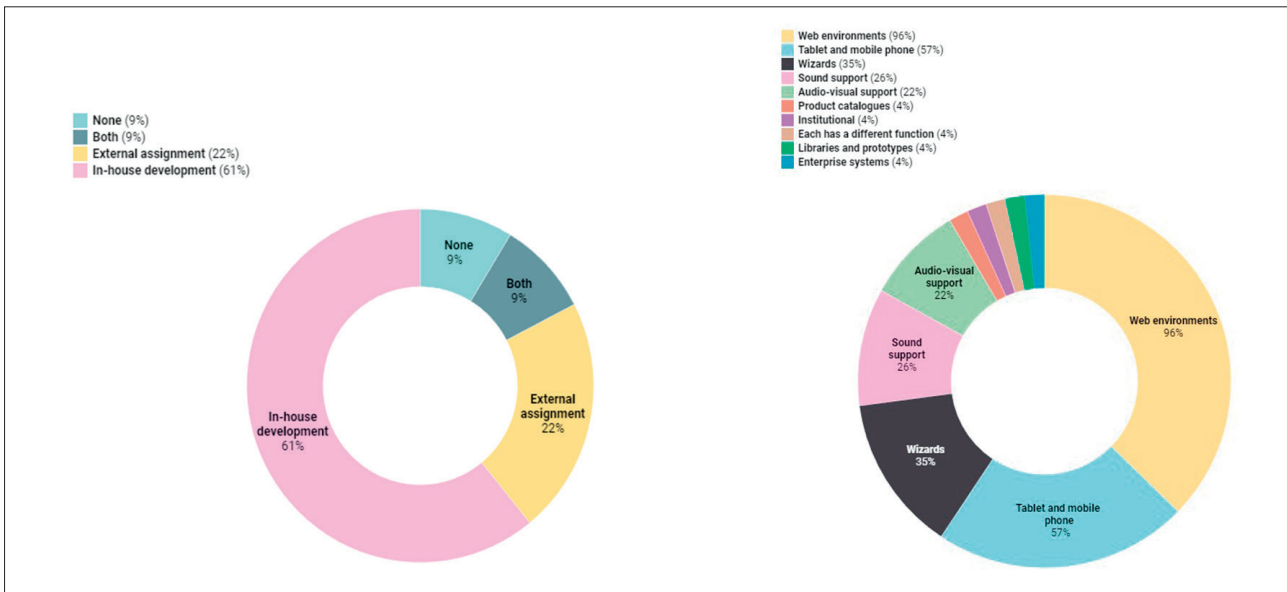
Graph 2. Type of development and platform targeted by AI tools

The companies surveyed highlight the adaptability of these digital tools, which can be extrapolated to other projects (86.95%) and adapted to the needs of each medium. Some can even be applied to other areas, "such as the e-commerce (...), administrative (...) or pharmaceutical sector" (*Narrativa*). The period of development is variable, depending on the features required, and ranges from one month to several years, or a continuous updating process.

The companies consulted evaluated the profitability of AI in means of communication (Graph 3), both for them (43.47%) and for the latter (23.33%). Although they do not represent a majority, some say that these tools do not contribute monetary benefits (17.39%), but rather that they optimise journalistic functions and the relationship with audiences, such as a reduction in workload (13.04%) and costs (4.34%), increased engagement, loyalty (8.69%) and advertising (4.34%), among others.
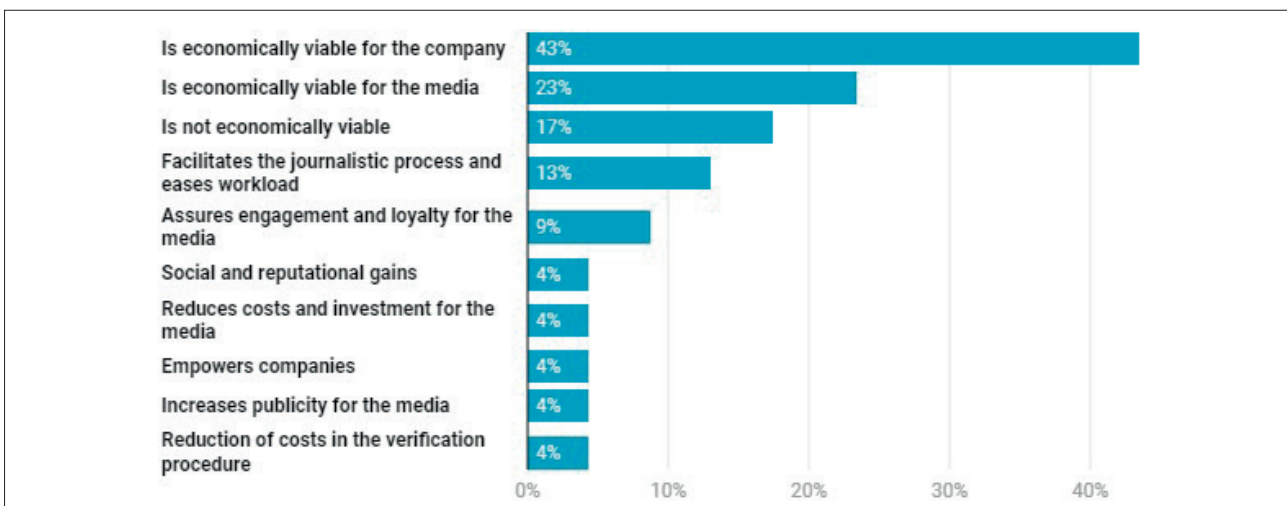
Graph 3. Profitability of firms and media in the use and development of AI tools

3.2. Catalogue of AI application in three phases of the journalistic process: information-production-distribution

The AI tools offered can be applied to the entire information and business process of a means of communication, grouping services and tools in a new catalogue, highlighted in the second objective (O2), and focusing on the three main phases of the journalistic process already described:

- automated gathering of information;
- automated content production;
- distribution of information and audience relations.

The taxonomy resulting from consultation with technological and research centres (Graph 4) reflects the diversified AI availability in formats –textual, audiovisual, sound– and platforms, especially on the web and social networks.

The greatest number of benefits are related to distribution and audience engagement (Phase 3), followed by information gathering (Phase 1) and, to a lesser extent, automated news production (Phase 2). That is, AI and the resources are applied more to how segmented and potentially interested audiences are reached. Up to 20 of the companies focus on this phase, offering varied services such as audience segmentation analysis, curation and recommenders, social network analysis, subscription, or competitor trend analysis, among others.

In the case of the information gathering phase, there are tools or services aimed at journalists themselves, which facilitate prior preparation by searching for information for documentation, contextualisation and data verification. In this case, almost half of the companies (12) include tools which search for, extract and classify previous data, document reports and infographics, analyse texts and videos, and provide prior verification of sources or semantic analysis and thematic trends, among others.

Finally, the automated news production stage shows only four companies with services such as the automatic generation of news and infographics, making this the least developed speciality.
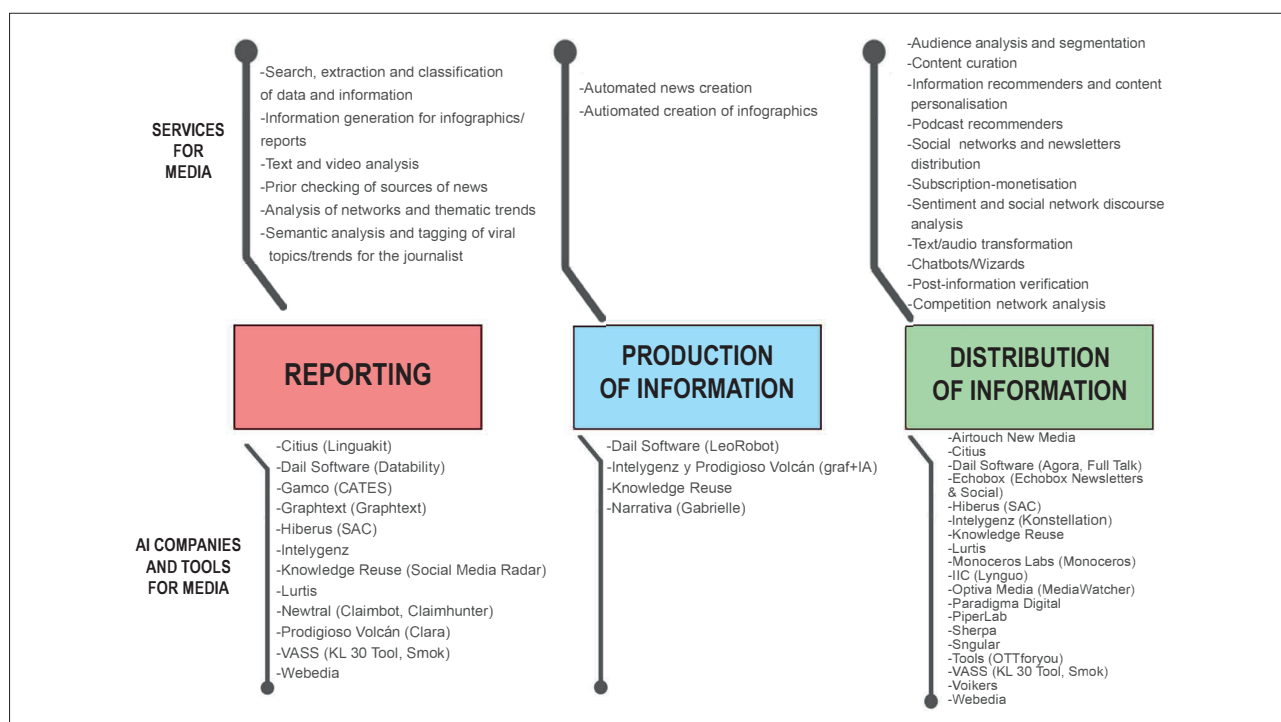
Graph 4. Artificial intelligence in three stages of the journalistic process

3.3. Opinion of technology companies regarding AI in the media: "slowness", "distrust" and "lack of knowledge"

A combined analysis of in-depth interviews and questionnaires involving the representatives of innovation and technological development in the participating companies and centres has allowed us to gauge their opinion; this complies with the third objective (O3) regarding the evolution and interest of the Spanish media in applying AI. These coincide in terms of three main ideas attributed to the sector: "slowness", "distrust" and "lack of knowledge". The idea of "slowness" is linked to economic difficulty, since

> "the media have a very strong funding problem that limits them" (Brais Ramos, *Graphext*).

> "They are technologically very backward, and although they have evolved positively, their current struggle is how to monetise their digital content and they are not yet willing to invest in AI" (José María Fernández, *Intelygenz*).

There is a "clear reluctance of publishers" (Antonio Rueda, *Vass*) and there are two trends in the sector:

> "media that show concern about data and that has been increasing; and sceptical media" (David Torres, *Hiberus*).

They describe a resistance to change

"for fear of losing their jobs, especially journalists" (Jesús Cardeñoso, *Dail Software*).

But experts clarify that AI

"needs a lot of human work and what it offers to journalism is support to journalists and new services to the audience (...) The professional feels threatened, but, in reality, it allows him to dedicate himself to high-value tasks" (José María Alvarez, *Knowledge Reuse*).

A threat to labour that "is not real because automation does not eliminate jobs" (Sofía Sánchez, *Narrativa*) and contributes to "greater production and supervision of the entire process" (Roberto Jiménez, *Webedia*). The reality is one of "rejection and ignorance of the media" (David Corral, *OdiseIA*).

Newtral, a company specialised in fact-checking, shows that the application of AI has managed to shorten time and resources by 30%. In other words, "it does not mean reducing staff, but simplifying the process", since a robot will never carry out fact-checking, but "the criterion is always that of a journalist", argues Marilín Gonzalo, adding that more journalists have been hired. Thus, while other sectors are advocating the introduction of AI,

> The services and tools of the companies consulted make it possible to specify, organize and group the technological offer of AI in Spain in three phases of the journalistic process: information, gathering, content production and content distribution

"the media believe that it is not something that is going to help them, but something that is killing them. And in this they are wrong, they need to change their mentality" (José María Fernández, *Intelygenz*).

At the moment, "the media are reticent and focus more on spreading the word about AI than on applying it" (José Carlos Sánchez, *Prodigioso Volcán*).

This "slowness" and "distrust" is reinforced by the "lack of knowledge" shown by the media in not making use of their data to improve their efficiency, as Moisés Martínez from *Paradigma Digital* explains:

"The media are not clear about how to apply AI or the economic profitability of their investment (...). They have not kept internal databases, they are behind schedule and have a lack of knowledge".

Other media

"have been concerned about internalising data analysis, but they have directed them more to the visualisation part, not so much to AI" (Alejandro Llorente and *PiperLab*).

Experts warn that journalism must reinvent itself: "it needs a boost in AI" (Pablo Gamallo, *Citius*).

When asked about the challenges of the future, they highlight the need to assume the change in audiences, who are "more polarised and emotional" (Armando Ávila, *Airtouchmedia*), and

"understand well the algorithms of the audience platforms that mark the relevant changes" (Roberto Jiménez, *Webedia*).

They also point out the challenge of data verification to

"assume the huge amount of disinformation that moves in networks. Without technological support it is impossible for these media to carry out their verification work" (Rubén Míguez, *Newtral*).

In addition, they even point out that one of the challenges is to promote a

"predictive journalism in which AI is used through metrics of reality, giving recommendations to establish future needs. That would be to opt for a current, scientific and sensory journalism" (Armando Avila, *Airtouchmedia*).

Furthermore, there is the ethical approach, which involves tackling "algorithm bias" (David Corral, *OdiseIA*) and data privacy.

In short, the experts consulted depict an irreversible reality, in which "quality technology favours quality journalism" (David Torres, *Hiberus*), and warn that

"it will be an obligatory change, because it goes beyond the sector itself, it is a technological and social transformation" (David Corral, *OdiseIA*).

4. Discussion and conclusions

The research concludes with an approximate catalogue of Spanish technology companies and research centres with AI tools and services applicable to journalism, and a taxonomy of the different phases of the journalistic process where they can be implemented.

The study confirms the initial hypothesis substantiated by the companies and experts consulted, with their data and interviews revealing that in Spain the technological offer of AI applicable to journalism contrasts with its slow incorpora-

tion by the media. Likewise, although there is a growing interest and a continuous expansion of AI in all sectors (*Ministerio de Asuntos Económicos y Transformación Digital*, 2020; **Chui** *et al.*, 2021), there is still a disparate progress between its business-technological development and its actual application in the media.

> " Companies point to an increased interest in developing tools for audience distribution and metrics, driven by the relevance of profitability and content monetization "

Through in-depth interviews and questionnaires involving 45 representatives of technological companies and research centres (N=25), three main conclusions are obtained regarding the available tools, and the current implementation and trends of AI in the Spanish media.

Firstly, the overview of the Spanish technology companies and research centres available confirms the development of AI in Spain during the last decade, and especially during the last five years; this coincides with the international context (**Firat**, 2019), and the existence of services and tools provided by service-generating companies (**Túñez-López**; **Toural-Bran**; **Cacheiro-Requeijo**, 2018). In most cases, the number of engineers and technicians is larger than that of journalists, with the exception of teams developing specific AI tools for the media, where the Engineering and Journalism profiles are more similar.

Secondly, the research offers an innovative catalogue of companies and technology centres with their AI tools and services applicable to journalism and in diverse formats –textual, audiovisual, audio– and platforms, especially the web and social networks. In addition, by means of a taxonomy we designed, it is shown that the technological availability of AI is grouped around three phases of the journalistic process: information gathering, production of content-information and distribution. This analysis confirms that the use of algorithms occurs in all stages of the production chain, integrating the gathering, storage, creation, transmission, distribution and consumption of information (**Diakopoulos**, 2019; **Túñez-López**; **Fieiras Ceide**; **Vaz-Álvarez**, 2021). However, the proposed taxonomy reflects a greater technological offer in the journalist's information search and documentation processes (Phase 1), and information distribution (Phase 3); this contrasts with a more limited offer in the automated news and content production phase (Phase 2). This can be partially explained by the search for AI profitability being more related to content distribution and audience engagement in terms of monetisation and loyalty. The process is optimised on the basis of consumption studies, trends and news personalisation. In other words, the media are more interested in how to reach segmented and potentially interested audiences.

As a final conclusion, the assessment carried out by the experts consulted corroborates the reluctance of the media to face and assume the inevitable expansion of AI, with companies undertaking the championing of the technological disruption process (**Salaverría**; **De-Lima-Santos**, 2020). The technology companies consulted confirm that, compared to other sectors more advanced in AI, the media sector reflects "slowness", "distrust" and "ignorance", which they blame on issues of financial difficulty, fear of labour restructuring and short-sightedness regarding profitability. Such an appreciation seems to be less common among large media groups that have begun to apply AI, especially that linked to the analysis of internal and audience data.

Despite the limitations of a small sample which is not easy to pinpoint and a sphere that is still developing, which makes it difficult to establish study variables or 'fixed' results over time, it can be appreciated that there is a disparate interest on the part of the Spanish media in applying AI; meanwhile, Spain's technological offer is in place and available for a change that experts predict as inevitable. Services and tools transformation, as well as the updating of the catalogue presented, will require ongoing research to investigate the new applications of these technologies, the renewal of journalistic models and their audiences, as well as their ethical challenges.

> " The experts consulted describe an "irreversible" technological reality; a "forced change" which, however, is received by the media with "slowness", "distrust" and "ignorance" "

5. Notes

1. The content of the questionnaire can be consulted at: *https://figshare.com/s/e92a047c39ddbcb26b86*

2. It is the only company participating in this study that is not of Spanish origin. We have chosen to keep it in the sample because of its direct collaboration with numerous Spanish media organisations.

3. This is the only organisation in the study that does not develop technology, but it has been included in view of its comprising AI experts who advise the media and offer training and ethical dissemination in AI.

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Use of artificial intelligence in synthetic media: first newsrooms without journalists

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Abstract

The boom in artificial intelligence and automated technology in the journalistic profession has given rise to what are called synthetic media (Crusafon, 2022), media outlets that produce and publish texts, audio, videos, and other news content through processes executed solely by algorithms, without any intervention from journalists. This research has several objectives: to identify the first synthetic media outlets already operating, to describe how these newsrooms without journalists work, to better understand the type of content they produce, and to find out whether these are isolated and ephemeral operations or if, on the contrary, they mark the beginning of a trend toward journalism without the direct intervention of journalists. To this end, we have used an exploratory methodology, enabling us to identify four synthetic media outlets, which have been taken as an analysis sample: *JX Press Corp* (Japan); *Reuters News Tracer* (United Kingdom), *News Republic* (France), and *Videre AI* (Spain). An analysis of the news content on each project's web pages was combined with in-depth semistructured interviews with the heads of technology and communication of the three European ventures. The Japanese initiative has no human staff, so its chatbot was the only way to obtain information. The purpose was to learn about the initiatives' news production process, their impact on the journalistic profession, and their viability. This analysis helps demonstrate that the journalistic world's reliance on artificial intelligence is becoming increasingly evident and that communication agencies are the first companies to invest in developing and distributing synthetic content to benchmark media. These initiatives, although still limited, are the most recent step in the process of gradually integrating artificial intelligence into news production.

Keywords

1. Introduction

The automation of news production and transmission is gradually becoming more widespread in the newsmaking process, to the point that there are newsrooms that are already fully staffed by robots that perform all the tasks involved in the stages of information gathering, text processing, and news transmission. Media outlets without journalists, or synthetic media (**Crusafon**, 2022), are the most recent development in the process of gradually integrating artificial intelligence (AI) into news production, which has led to an increasing robotization of news production since the first applications for the automation of journalism were created in the late 1980s (**Russell**; **Norving**, 2003).

Since the *Quakebot* algorithm of the *Los Angeles Times* first published news about an earthquake in California in March 2014 (**Ufarte-Ruiz**; **Manfredi-Sánchez**, 2019), this technology has been applied by leading international media outlets (**Prisecaru**, 2016), reshaping the way that news is produced with changes in journalistic routines and dynamics (**Diakopoulos**, 2019; **Flores-Vivar**, 2018; **Lindén**, 2017; **Lokot**; **Diakopoulos**, 2016; **Oppenheimer**, 2018; **Powers**, 2012; **Túñez-López**; **Toural-Bran**, 2018):

- In Brazil, they are used to write news about House bills (**Monnerat**, 2018),
- the Chinese media outlet *Southern Metropolis Daily* experimented with the *Xiao Nan* robot for text production (**Martin**, 2017), and
- the *Financial News* in South Korea publishes automated pieces about the stock market (**Jung** *et al*. 2017).

In Europe, **Gani** and **Haddou** (2014) note that *The Guardian*, the *BBC*, and *The Telegraph* have also joined in this trend, using AI to report election results in France (**Sánchez-Gonzales**; **Sánchez-González**, 2017) and Finland (**Melin**, *et al*., 2018). In Sweden, the newspaper *Svenska Dagbladet* developed an algorithm to personalize its homepage (**Stern**, 2017); in Germany it is used for sports coverage (**Horky**; **Pelka**, 2017); and in Norway, it is used to increase the efficiency of journalists (**Karlsen**; **Stavelin**, 2014). **De-Lara**, **García-Avilés** and **Arias-Robles** (2022) state that, in Spain, the media outlets and specialized agencies that are investing in artificial intelligence are *Mediaset*, *El confidencial*, *Maldita.es*, *Newtral*, *ABC*, *El periódico*, *Marca*, *El mundo deportivo*, *As*, *Prensa ibérica*, *Antena 3*, *Prisa radio*, *Europa Press*, *Narrativa*, *Prodigioso volcán*, *RTVE*, *Google news España*, *El país*, *TeleMadrid*, *Agencia EFE* and *El español*.

News automation is currently in a developmental stage (**Calvo-Rubio**; **Ufarte-Ruiz**, 2021), intertwining artificial intelligence applications' role in

- improving productivity and efficiency (**Papadimitriou**, 2016);
- increasing business profit (**Mittal**; **Kumaraguru**, 2014);
- enhancing accuracy (**Silverman**, 2013) and objectivity (**Graefe**, 2016);
- examining the credibility (**Wölker**; **Powell**, 2018) and quality of automated news (**Sandoval-Martín** *et al*., 2019);
- recognizing patterns and trends (**Lemelshtrich-Latar**, 2018; **Steiner**, 2014; **Van-der-Kaa**; **Krahmer**, 2014);
- reducing the impact of disinformation and fake news (**Flew** *et al.*, 2012; **Flores-Vivar**, 2019; **Manfredi-Sánchez**; **Ufarte-Ruiz**, 2020);
- finding profiles on social networks (**Dickerson**; **Kagan**; **Subrahmanian**, 2014; **Ferrara** *et al.*, 2016; **Tavares**; **Faisal**, 2013); and
- personalizing information (**Newman** *et. al.*, 2019; **Keeney**, 2015; **Slater**; **Rouner**, 2002).

The primary goal of automation is to make the journalist's work more efficient, so in the opinion of **Autor** (2015), its implementation in the media beyond the sports and financial sections is crucial (**Meehan**, 1977). New professional roles, such as impact editor and platform editor, are also in demand (**Sixto-García**; **Rodríguez-Vázquez**; **López-García**, 2021).

The result is that, currently, four out of ten newsrooms already use artificial intelligence in news production (*The Journalism AI Report*, 2019), a practice that, in the scientific literature, has been referred to as

- artificial journalism (**Túñez-López**; **Toural-Bran**; **Valdiviezo-Abad**, 2019);
- robot journalism (**Burrell**, 2016; **Kim** *et al.*, 2007; **Lee**; **Kim**, 1998; **Levy**, 2012; **Salazar-García**, 2018; **Van-Dalen**, 2012);
- algorithmic journalism (**Anderson**, 2013);
- automated journalism (**Caswell**; **Dörr**, 2018; **Clerwall**, 2014; **Napoli**, 2014);
- computational journalism (**Coddington**, 2015; **Cohen**; **Hamilton**; **Turner**, 2011; **Gynnild**, 2014; **Vállez**; **Codina**, 2018);
- augmented journalism (**Ferrer-Conill**, 2015; **Pavlik**; **Bridges**, 2013); or
- high-tech journalism (**Salaverría**, 2016).

The first synthetic media outlets emerged on this technological scene (**Crusafon**, 2022); they have digital newsrooms that produce and publish texts, audios, videos, and other digital content through processes executed solely by algorithms, without any intervention from journalists. These media outlets have ignored the legal implications (**Montal**; **Reich**, 2017; **Weeks**, 2014) and the ethical and deontological challenges posed by the

> " Synthetic media outlets have digital newsrooms that produce and publish texts, audios, videos, and other digital content through processes executed solely by algorithms, without any intervention from journalists "

use of artificial intelligence in journalism, which include fact-checking, training professionals for its use and application, promoting transparency, detecting and controlling algorithmic biases, and not losing sight of the sense of commitment and social responsibility inherent in journalism (**Craig**; **Ketterer**; **Yousuf**, 2017; **Díaz-Campo**; **Chaparro-Domínguez**, 2020; **Lewis**; **Westlund**, 2015; **Thurman**; **Dörr**; **Kunert**, 2017; **Ufarte-Ruiz**; **Calvo-Rubio**; **Murcia-Verdú**, 2021).

The automated news agency *Reporters And Data And Robots* (*RADAR*), created jointly in the United Kingdom by the *Press Association* and the data journalism startup *Urbs Media*, can be seen as a forerunner to these projects. Since 2018, the company has produced and distributed about 30,000 local news items per month automatically, only using public and government agencies databases. Its development model is similar to that of the US news agency *The Associated Press*, which used the software *WordSmith* to produce about 1.5 billion articles in 2014 without the intervention of a human journalist (**Nilsson**, 2019).

It is true that the development of these media is still in its incipient phase, but some international ventures are already beginning to take shape. Even upon an exhaustive review of the scientific literature, it was still not possible to identify relevant research on synthetic media and their impact on the journalistic profession, despite the fact that **Acemoglu** and **Restrepo** (2019); **Bostrom** (2014); **Bravo-Orellana**, **Santana-Ormeño** and **Rodón-Módol** (2014); **Brynjolfsson** and **McAfee** (2014); **Cerezo** (2018); **Cervera** (2017); **Cosoy** (2017); **Matsumoto** *et al.* (2007); and **Valdiviezo-Abad** and **Bonini** (2019) have warned that letting bots into newsrooms could lead to an unemployment crisis in the sector. Only **Barrat** (2013) predicts that this tool means the end of the human era, though he does not go into detail.

Hence, we have the opportunity to carry out this pioneering research at the national level using few references to the scientific literature. At the international level, studies by **Wu**, **Tandoc**, and **Salmon** (2019) and **Graefe** and **Bohlken** (2020) partially analyze this recent and constantly developing phenomenon. The works published to date have focused on media outlets that have started using automated writing or that have established partnerships with companies that specialize in natural language generation software. Therefore, this research is a pioneer in the area, as it attempts to identify the first media outlets that produce and distribute news through procedures carried out solely by machines –where no journalists are involved in writing or creating voiceovers for the text– at a time when the rapid pace of economic, social, and technological changes has highlighted the important role that innovation plays in gaining a competitive advantage in the journalistic sector.

Newsrooms without any journalists pose a major challenge for the industry, despite the fact that studies tend to focus on large media outlets with huge newsrooms, notwithstanding the current fragmentation of the sector. This is why more and more authors have identified a need to cast the perspective of the centralism of newsrooms out of academia and focus on developments in the sector that fall outside the ways in which traditional journalism is done (**Deuze**; **Witschge**, 2017).

The aim of this study is not to make generalizable conclusions but rather to consolidate descriptive knowledge about a research problem that requires scientific research to better establish its definition. Due to its prospective nature, we start from a blind hypothesis. Our objective is to identify cases of important pioneers in this activity, through which we aim to answer the following research questions:

Q1. How do these projects simulate human behavior when managing content and navigating interactions?

Q2. Have they had a negative impact on employment?

Q3. Are these newsrooms the companies of the future?

Q4. Are journalists unaware of their existence?

Q5. Has the image of the profession been affected?

Q6. What is their impact on news from public media outlets?

2. Objectives and methodology

The main objective of this research is to identify companies, media outlets, and agencies that only use algorithms to generate news content in the same way that an editor would do but without human intervention from a journalist. The study has the following secondary objectives:

SO1: analyze the production process of automated news;

SO2: examine how it engages its audience in a personalized way;

SO3: measure its impact on the journalism profession; and

SO4: evaluate its economic viability.

The staged methodological design was required to achieve these objectives (**Igartua**, 2006), resulting in a methodological triangulation (**Gaitán-Moya**; **Piñuel-Raigada**, 1998), which, according to **Gómez-Diago** (2010) and **Soler-Pujals** and **Enrique-Jiménez** (2012), contrasts information across different sources to obtain sufficient contextualization of the phenomena studied. Each stage is presented clearly so that other researchers can replicate this process under different circumstances at a later time and obtain comparable results, supplementing them or corroborating them to enable a coherent analysis (**Ortega-Mohedano**; **Pereira-Galhardi**; **Igartua**, 2016).

First, we carried out a review of the scientific literature, part of the secondary research (**Codina**, 2017), which confirmed that there were no prior studies on the subject being studied. As a consequence, a methodology based on the nonprobabilistic sampling system, known as snowball sampling (**Goddman**, 1961; **Levand**, 2021), has been used. This technique, used in research when the population is variable and the sample is very small, is based on identifying subjects or experiences that are then gradually incorporated into the sample (**López-Roldán**; **Fachelli**, 2015; **Otzen**; **Manterola**, 2017). It has made it possible to recognize patterns that go beyond a fleeting snapshot of the state of play (**Sixto-García**; **López-García**; **Toural-Bran**, 2020) and to identify the intentional sample studied herein.

The exploratory study was based on data from two projects: (1) The global initiative *JournalismAI from the London School of Economics*, which helps the media use artificial intelligence responsibly, and (2) the Swedish company *United Robots*, which develops bots to automatically send content to audiences. To the indicators provided by these companies we have added the projects identified by **Dörr** (2016); **Fanta** (2017); and **Túñez-López**, **Toural-Bran** and **Cacheiro-Requeiro** (2018), who carried out a preliminary global mapping of the media outlets that rely on automating news production, as a research guide.

> Communication agencies are the first companies to commit to producing and distributing synthetic content to reference media

The fieldwork consisted of collecting and compiling data, for which an advanced *Google* search based on a series of keywords (Table 1) was used. The search was not limited by language, region, site or domain, file type, or date. Additionally, the selection criteria included only those initiatives that produce and publish news content through processes carried out exclusively by algorithms, without any human intervention. Searches were conducted every 15 days for six months (from January to June 2022), making a total of 12 searches. Such a time frame is necessary in a study type in which the breadth of the sample is unknown (**Mauri-Ríos**; **Ramon-Vegas**, 2015).

Table 1. Search terms

"Media outlet" OR "Media outlets" OR "Newsroom without journalists" OR "Newsrooms without journalists" OR "Synthetic media"	AND	"bots" OR "artificial intelligence" OR "artificial journalism" OR "robotic journalism" OR "algorithmic journalism" OR "automated journalism" OR "computational journalism" OR "augmented journalism" OR "high-tech journalism"

As a result, four projects have been identified:

- *JX Press Corp* (Japan);
- *Reuters News Tracer* (United Kingdom);
- *News Republic* (France), and
- *Videre AI* (Spain).

The technique used for analysis was the case study, which provides the researcher with various resources such as interviews, participant observation, questionnaires, or bibliographic documents, allowing for sufficient contextualization of the phenomena being studied (**García-Avilés**; **González-Esteban**, 2012). Following the research of **Yin** (1981) on this research technique, this work does not attempt to make a statistical generalization but rather an analytical one, since it aims to find a pattern of behaviors rather than quantify sample frequencies (**Villareal-Larrinaga**; **Landeta-Rodríguez**, 2010).

Third, once the study units had been defined, an analysis sheet was drawn up and applied to each of the selected synthetic media outlets. This sheet was composed of a total of 20 classification codes, grouped under eight variables and three dimensions, in accordance with the objectives pursued (Table 2).

- The news production process dimension (D1) analyzed the way in which the media outlet simulated human behavior to detect newsworthy points (V1), through social listening (C1), the monitoring of social networks (C2), or the automatic selection, rating, and distribution of content (C3). In this same dimension, audience engagement methods (V2), such as unbiased and fact-checked news (C4), content personalization (C5), and speed of reporting (C5), were examined.
- The second dimension made it possible to determine the impact (D2) that these projects had on the job market (V3), assessing whether they have contributed to job destruction (C7) or, on the contrary, have had no effect on employment (C8). It also assessed their impact on the journalistic profession (V4) as well as the sector's awareness of synthetic media (V5).

- The third dimension aimed to determine their economic viability (D3), analyzing, as main potentialities (V6), their financial backing (C13), the media outlets affiliated with them (C14), and their client portfolio (C15). Economic constraints were separated into high investment (C16) and competition (C17), while also analyzing whether they were lacking (C18). Finally, we analyzed whether these projects are likely to stand the test of time and become the businesses of the future (V8).

Table 2. Analysis parameters

Dimensions	Variables	Classification codes
D1. News production process	V1. Simulation of human behavior	C1. Social listening
		C2. Social media monitoring
		C3. Selection, rating, and distribution of content
	V2. Audience engagement methods	C4. Unbiased and fact-checked news
		C5. Content personalization
		C6. Faster reporting
D2. Impact	V3. On the job market	C7. Job destruction
		C8. No impact on employment
	V4. On the image of the profession	C9. Negative impact on the profession
		C10. No impact
	V5. The sector's awareness of these projects	C11. The sector's awareness
		C12. The sector's lack of awareness
D3. Economic viability	V6. Potentialities	C13. Financial support
		C14. Affiliated media outlets
		C15. Customer portfolio
	V7. Constraints	C16. High investment
		C17. Competition
		C18. No limitations
	V8. Future prospects	C19. Has future prospects
		C20. Does not have future prospects

Prior to coding, five descriptive features were identified for each project:

- the name of the company;
- its year of creation;
- its founder;
- its main objectives, and
- the services offered.

The analysis sheet was initially completed using web content analysis (**Herring**, 2010), which provides for the inclusion of Internet elements, such as links and multimedia elements, and complements traditional content analysis (**Bardin**, 1986; **Krippendorf**, 2004). To ensure that the coding was reliable, each project's sheet was studied by each of the researchers in parallel, prior to defining the classification codes (*double-check*), and possible discrepancies, such as not considering AI to be a substitute for human journalists in synthetic media outlets, were considered in preceding meetings.

The fieldwork was rounded out with interviews with the heads of technology and communication from the three European initiatives. At *Videre AI*, we interviewed Javier Picazo, head of the technological service and digital transformation at the *Agencia EFE*, whereas, at *News Republic*, we interviewed Gilles Raymond, founder and CEO of the initiative. To address the aspects of *Reuters News Tracer*, we spoke with the Global Head of Communications, Jamie Austin. *JX Press Corp* is fully automated to the point that the interview had to be conducted through the company's chatbot, in the absence of human staff.

In the opinion of **Tejedor** *et al.* (2020), this technique makes it possible to obtain information on a phenomenon that has not been sufficiently covered in the scientific literature while at the same time providing explanatory elements and indications of possible new prospective phenomena that can become study variables for future research. In the same line, **Irvine**, **Drew**, and **Sainsbury** (2012) argue that interviews are useful to learn about the perspectives of the interviewed subjects, as well as their mental categories, interpretations, feelings, and predictions for the future.

The interviews were conducted during the month of June 2022 through *Google Meet* and *Zoom.* We used a semistructured projective questionnaire, that is, one with a common list of objectives or items that combined closed questions with open-ended, unstructured, and direct questions (Table 3). The questions were grouped into thematic sections: the

contextual aspects of creation, the news production process, the consequences that synthetic media have for the journalistic profession, and the projects' future plans.

Table 3. Case studies and interviews conducted

Case studies	Interviews conducted			
	Name	**Position**	**Method of interview**	**Date**
JX Press Corp	Company chatbots			June 9, 2022 June 12, 2022
Reuters News Tracer	Jamie Austin	Global Head of Communications	*Zoom*	June 17, 2022
News Republic	Gilles Raymond	Founder and CEO	*Zoom*	June 24, 2022
Videre AI	Javier Picazo	Head of technological service and digital transformation	*Google Meet*	June 20, 2022

The interviews were recorded and transcribed so that they could be used in content analysis, enabling an in-depth data analysis, taking into consideration the research objectives. The content analysis was conducted using the *Atlas.ti* version 9.1.7 software for *Windows* and was carried out in four stages:

- the recording of information from the interview transcript;
- the coding of the data;
- the identification of the information obtained on each of the aspects related to the objectives; and
- a final interpretation of the results obtained. The coding and categorization of the data have been replicated and agreed upon to avoid possible biases and to guarantee the reliability of the results.

With this methodological combination, the research problem has been viewed from different angles, and biases and methodological flaws have been avoided to optimize the validity and consistency of the findings (**Okuda-Benavides**; **Gómez-Restrepo**, 2005).

3. Results

3.1. *JX Press Corp* (Japan)

This Tokyo-based virtual news agency was founded on January 10, 2008, by Katsuhiro Yoneshige, although it became known in 2017 for reporting on the assassination of North Korean politician Kim Jong-Nam before any other media outlet. It has a capital of 100 million yen, and it has had three member organizations since its launch:

- *Japan Association for Public Opinion Research*;
- *Japan Internet Media Association* (*JIMA*);
- *Artificial Intelligence Disaster Prevention Council.*

This startup without journalists believes that

> "it has changed the way we do news thanks to Big Data and technology",

as its chatbot said. So when it comes to producing automated news, the artificial intelligence uses social listening to monitor social media platforms and find breaking news events domestically and internationally, to automatically write news stories, and to distribute them to its clients, which include the *Japan Broadcasting Corporation* (*NHK*) and television networks *Nippon Television*, *TV Asahi*, *TBS Television*, *TV Tokyo*, and *Fuji Television*. It also distributes automated news to newspapers *Asahi Shimbun*, *Yomiuri Shimbun*, *Mainichi Shimbun*, *Sankei Shimbun*, and *Chunichi Shimbun*; news agencies *Kyodo News* and *Kyodo Digital News*; the digital media outlet *Sankei Digital*; the platform *Panasonic Connect*; and the corporation *Quick Corp*, among others.

It offers two products to all of their clients:

- *Fastalert*, a technology service that filters out fake news and sends out news bulletins on accidents, natural disasters, and incidents.
- the free mobile application *NewsDigest*, which enables the consumption of breaking news from different points of view, such that it engages the audience with news written with a variety of sources and without bias. This application already has more than 1 million downloads in the *Apple Store* thanks to its instant coverage of the latest events.

The two services have been developed and are operated using the *XWire* tool, whose purpose is to automate the editing and distribution of news through natural language processing technology, which makes it possible to convert text or voice into structured information. Therefore, there is no human intervention in the whole process: "There are no reporters or news bureaus, but our news items are the fastest", the bot remarked. This situation "reduces the number of editorial staff and the operating costs".

The startup's value proposition is to "embody the fact that machines meet human expectations," so that, in the future, newsrooms will not have journalists, and there will be no orders from them. Regarding its viability, the company has financial backing from some high-profile companies in the country, such as news giant *Nikkei* and venture capital firms *Mitsubishi* and *CyberAgent Ventures*; however, the agency's website does not disclose revenue figures.

Sheet 1. Summary of the analysis of *JX Press Corp*

D1	V1	C1. Social listening C2. it monitors social networks and finds breaking news events C3. it automatically selects, composes, and distributes
	V2	C4. News written with different sources and without bias C6. Faster in revealing the latest news
D2	V3	C7. Reduced editorial staff
	V4	C10. It has not affected the image of the profession
	V5	C11. The country's journalistic sector is aware of the project
D3	V6	C13. Strong financial backing C14. Media affiliates and partner organizations C15. Broad customer portfolio
	V7	C18. No limitations
	V8	C19. It is a feasible project with prospects of success in shaping the future of newsrooms without journalists

3.2. *Reuters News Tracer* (United Kingdom)

This "cyber newsroom", as Jamie Austin called it, was created in January 2016 by the agency's R&D team to automate the entire news production process, including searching, classification, editing, and, finally, dissemination. Everything is done in real time, without human intervention, through ten machine learning algorithms that work in four different phases that correspond to the different stages in the production of a news item.

The first focuses on finding news events, for which it uses the conversations users have on *Twitter*. The software for the artificial intelligence and machine learning analyzes around 12 million tweets per day in real time, which represents 2% of the total number posted worldwide. Of this amount, half is selected randomly, and the other half comes from the accounts of organizations and influencers, which are selected by the agency's human journalists. Once the news stories have been found, the second phase begins, focusing on making sense of and contextualizing the data to make it newsworthy and engage the audience.

To emulate this process, machine learning checks which breaking news events have already made the news using a database of 31 media outlets, such as *CNN*, the *BBC*, and *The New York Times*, among others. In addition, it knows where the event is taking place thanks to a database based on words and city locations. In this second phase, it also verifies the information by analyzing the source's profile, followers, media attachments, links, and tweet structure. The third phase focuses on writing the news item. Here, the algorithm compo-

Sheet 2. Summary of the analysis of *Reuters News Tracer*

D1	V1	C2. It monitors social networks to find news events C3. It automatically categorizes, composes, and disseminates
	V2	C4. Unbiased and fact-checked information C5. Personalization of news items through the selections of news items or headlines C6. Increased speed in reporting the event
D2	V3	C8. No impact on employment
	V4	C10. It has not affected the image of the profession
	V5	C11. The agency's media partners are aware of the service
D3	V6	C13. It is financially backed by the agency C15. Same clients as the agency
	V7	C18. No limitations
	V8	C19. Feasible project if more sophisticated information is produced

ses a short headline and summary for each story, a design that aligns with *Reuters*' internal alert system, where breaking news is transmitted internally as short headlines. Finally, the system distributes the news items to the agency's journalists and clients so that they can publish the news as soon as possible.

However, journalists' interests may vary depending on the section they work for. Therefore, the algorithm is parameterized to personalize the news items through the selection of news or headlines. In addition,

> "this software's potential lies in its ability to detect news faster than other media outlets and its suitability to guarantee the veracity of the news event, giving it a one-hour-and-eight-minute advantage over other media," explains the global head of communications.

The system has several challenges, since its specialty is detecting accidents, conflicts, and natural disasters but not other more sophisticated information. For these reasons, "journalists will not lose their jobs because of automation", Austin qualifies.

3.3. *News Republic* (France)

This digital news provider was founded by Gilles Raymond, also its CEO, on January 1, 2008, and vanished completely on March 14, 2021. It began with a mobile version, which was later extended to tablets and smart watches, where it provided the user with personalized and relevant news to read "whenever they want and in the format they have chosen", explained its creator.

News Republic worked with more than 1 million topics, which helped personalize the user's news wall, working with more than 50,000 articles, thousands of photographs and videos, which were reproduced by algorithms to suit the reader's preferences. Raymond pointed out that one of the decisions they made from the beginning was "not to crawl the web" so as not to harm the rest of the media, but "we closed business agreements with thousands of companies all over the world" with the aim of publishing a huge amount of news per day for more than 40 countries and in 37 different languages. In its later versions, it published news from 53 countries. In this case, the user did not receive all the news offered by the company through their wall; rather, they chose which of the various options fit their preferred topics.

In relation to the automated news production process, the company had artificial intelligence software that carried out several phases: first, it learned what each news item meant, classified them into different categories, and verified their originality. After this, the user had to use the platform to select from the various topics suggested to customize the texts that would be displayed in the future. However, there was never any intervention from news professionals, although the initiative was fed by the texts produced by the various media outlets with which they had agreements.

In Raymond's opinion, this company does not replace an editor's work because "without journalists, there is no news", since they are the "only ones who can verify the facts". Therefore, this project was configured with a tendency toward disaggregation or misalignment. At the time of its launch, it had two limitations: The first was that some representative media outlets from different countries did not participate in the undertaking owing to a lack of awareness, and the second was the huge amount of news on the same topic that the reader received every day.

However, the main draw for the audience was the variety of information they could consume "on a personal device", in addition to having a "free" platform and being their "own news editor". In fact, "readers consumed an average of almost 200 pages a day", said the company's founder.

Regarding its viability, the initiative had 12.5 million users in 2015, which led it to win the award for *Best Mobile Media Publishing App* at the *Mobile World Congress*. *News Republic* went through different owners, and due to excessive competition, it was sold for $57 million to China's *Cheetah Mobile* in 2016, which, two years later, sold the venture, this time for $30 million more than it cost to *ByteDance*, a company owned by *TikTok*.

Sheet 3. Summary of the analysis of *News Republic*

D1	V1	C3. Selection, rating, and distribution of content
	V2	C4. Unbiased and fact-checked information C5. content personalization C6. faster reporting
D2	V3	C8. It did not replace an editor's work
	V4	C10. It did not damage the image of the profession
	V5	C11. The agency's media partners were familiar with the service
D3	V6	C13. Business agreements with different media outlets C15. Media partners from different countries
	V7	C17. Excessive competition
	V8	C20. The company vanished in 2021

3.4. *Videre AI* (Spain)

Agencia EFE and the *European Pressphoto Agency* (*EPA*) were selected in May 2022 by the *Stars4Media* exchange program between European media and technology companies to develop the artificial intelligence tool *Videre AI*, capable of clarifying the processes of cataloging, identification, and distribution of audiovisual content in the media. The program entailed a collaboration with German startup *Design AI*, which specializes in generating content through video using machine learning, and aimed to use automation to free journalists from tedious work, such as searching databases so they could focus on producing higher-value journalism. "The purpose was to empower the agency's human team, but never to replace it" ["*El propósito era empoderar al equipo humano de la agencia, pero nunca reemplazarlo*"], Javier Picazo elaborated.

However, this initiative, which was recognized as the best digital transformation project at *Stars4Media*, was never fully implemented because executing it was neither scalable nor viable.

> "Artificial intelligence and automation have a place in newsrooms, but their impact is still limited. A high initial investment would have been necessary" ["*La inteligencia artificial y la automatización tienen un lugar en las salas de redacción, pero su impacto aún es limitado. Fue necesaria una elevada inversión inicial*"] said Picazo.

Videre AI's role was to implement three phases of the audiovisual production process. The first two were related to the cataloging and identification of videos, automatically recognizing video images and generating file metadata, such as the date, keywords, duration, and journalistic genre –an essential task in streamlining the editors' workload and redu-

cing errors in metadata generation. These first stages were completed after a training process of four months and approximately 150,000 videos, and they were applied to a variety of newsworthy topics.

However, the program did not succeed in its third task: to automatically generate and distribute headlines, subheadlines, and short bodies of text to enhance the agency's audiovisual content.

> "The algorithm did not analyze or understand what was happening in the videos, despite being parameterized and having training data" ["*El algoritmo no analizaba ni entendía qué estaba sucediendo en los vídeos, a pesar de estar parametrizado y contar con datos de entrenamiento*"],

Sheet 4. Summary of the analysis of *Videre AI*

D1	V1	C3. Cataloging, identification, and distribution of audiovisual content
	V2	C4. Fact-checked news C5. content personalized to the agency's media partners
D2	V3	C8. It did not replace the human team
	V4	C10. It did not impact the image of the profession
	V5	C11. The agency's media partners are familiar with the service
D3	V6	C13. It was financially backed by the agency C14. Large number of members C15. Same clients as the agency
	V7	C16. High initial investment
	V8	C20. The project was never fully implemented

added the head of the technological service. He acknowledged that, despite this, it did manage to transcribe the voice to convert it into text in several languages.

In all of these stages, contrary to its main objective, journalist involvement was necessary, because they had to supervise the content. They were, in short, the ones "who provided the quality of information that the agency required" ["*quien aportaba la calidad informativa que requiere la agencia*"], explains Picazo. However, the program is a differentiating tool in the fight against disinformation and in fact-checking, as it is capable of recognizing videos that have already been posted, cataloging them, and checking their location or broadcast date, thus avoiding false news from pre-existing content or intentionally falsely localized content. Likewise, it was trained to deliver personalized content to the agency's media partners.

The project was co-funded by the European Union, and its partners included the *Vrije Universiteit Brussel* (*VUB*), the *European Media Laboratory* (*Euractiv Foundation*), the *European Federation of Journalists* (*EFJ*), and the *World Association of Newspapers and News Publishers* (*WAN-IFRA*).

4. Comparative analysis of the results

The combined study of the web content analysis of the four synthetic media outlets and the semistructured in-depth interviews with their heads of technology and communication allowed a comparative analysis of the results.

Table 4. Comparative analysis of the synthetic media outlets

Dimension	Variables	Classification codes	Synthetic media outlet			
			JX Press	*Reuters News Tracer*	*News Republic*	*Videre IA*
D1	V1	C1	✓			
		C2	✓	✓		
		C3	✓	✓	✓	✓
	V2	C4	✓	✓	✓	✓
		C5		✓	✓	✓
		C6	✓	✓	✓	
D2	V3	C7	✓			
		C8		✓	✓	✓
	V4	C9				
		C10	✓	✓	✓	✓
	V5	C11	✓	✓	✓	✓
		C12				
D3	V6	C13	✓	✓	✓	✓
		C14	✓			✓
		C15	✓	✓	✓	✓
	V7	C16				✓
		C17			✓	
		C18	✓	✓		
	V8	C19	✓	✓		
		C20			✓	✓

5. Conclusions

This research fulfills the main objective of identifying the first media outlets that produce and distribute news content through procedures carried out solely by machine, in which there is no intervention from any journalists. This is a pioneering study carried out at the national level that looks at a recent, on-going phenomenon, about which no scientific literature yet exists. This study

> Media outlets are aware of synthetic media, and they have established partnerships and business agreements to receive automated news in real time on a daily basis

identified four digital agencies in which no journalist is involved: the Japanese *JX Press Corp*, the British *Reuters News Tracer*, the French *News Republic*, and the Spanish *Videre AI*.

These companies were created from 2008 onward with the aim of fully automating news production through natural language processing and offering personalized content to the media and users. The results showed that there were similarities when it came to simulating human behavior in the news process (Q1). Assessment of these projects revealed that the algorithms learn from an initial set of data, such as images, voices, photos, objects, videos, and texts, among others, to select, classify, produce, and distribute artificial digital content with a realistic appearance and sound, based on programming indications. In short, they are voice clones, voice masks, unique expressions, photos, and interactive *bots* (SO1). This unbiased and fact-checked content has a unique interface that gives the media the opportunity to select and receive the topics they want, quickly and in a fully personalized way (SO2).

Regarding the impact they have had on the journalistic profession (SO3), the scope of analysis was not yet sufficient to draw conclusions, although, in the fields closest to the media outlets analyzed, it was not possible to determine whether the undertaking of such initiatives contributes to job destruction (Q2). The image of the profession has also not been affected (Q5), in line with the findings of **Aramburú-Moncada**, **López-Redondo** and **López-Hidalgo** (2022). Media outlets such as *CNN*, the *BBC*, or *The New York Times* are aware of synthetic media (Q4), and they have established partnerships and business agreements to receive automated news in real time on a daily basis. Japanese startup *JX Press Corp*, for example, counts Japan's public broadcaster, as well as other prestigious Japanese television stations and newspapers, among its clients. Specifically, the *NHK* pays a monthly subscription to this virtual news agency for its headline alert service, which is developed and disseminated entirely by robots. However, this preliminary study worked with a small sample, which prevented us from drawing conclusions about the impact that these projects have on the news from these public media outlets (Q6).

Instead, the research highlights that one of the main potentialities of the synthetic media outlets analyzed was the strong financial backing and the broad portfolio of clients they have. However, these initiatives had certain weaknesses, as there was no common interest in developing joint synergies or collaborative spaces that would allow them to share knowledge and acquire new clients. These ventures should seek efficient, sustainable models that serve the needs of journalistic practices. This requires more investment in experimentation, which is a starting point for future research (SO4).

Therefore, synthetic media would not be considered the companies of the future but rather a trend "toward disaggregation or misalignment" (Q3), as stated by Gilles Raymond, CEO of *News Republic*, which vanished on March 14, 2021. In this line, we added *Videre AI*, which was not fully implemented because it was unable to automatically generate headlines, subheadlines, and short texts to enhance the audiovisual content of *Agencia EFE*.

This research has not exhausted the issue studied; rather, it reaffirmed that newsrooms without journalists have raised

an open and constantly evolving debate. This pioneering work in the journalistic field leaves possibilities for future studies open. Extending the analysis to other initiatives will make it possible to verify whether the trends detected in these media outlets are overall trends. Likewise, a comparative view enabling us to understand how public and private media use content executed solely by algorithms would be enriching.

> These initiatives, although they are still few, are the most recent step in a process of progressive incorporation of artificial intelligence into information production

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Research on digital native media: an emerging topic in the field of digital communication

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Abstract

Digital native media have gone through different stages since their emergence in the last decade of the twentieth century under the shadow of the evolution of the 'network of networks' and digital transformation. Despite the influence that legacy media have exerted on the models of many digital media, the efforts they have made to find their own way in the digital communication ecosystem have resulted in the introduction of new practices and strategies that have fuelled renewed debates on journalistic frontiers. The aim of this paper is to review the birth, evolution and current landscape of digital native media with special attention given to research in this field. This is an object of study with its own and differential characteristics in relation to legacy media, which attracts the focus of more and more digital communication researchers every day. To offer a current assessment of such research, a systematized review of articles published in scientific journals included in the Web of Science and Scopus databases was carried out. The results show that the conceptualization of digital native media, their mapping in media ecosystems and comparison with legacy media, the study of their typology and characteristics, research on their economic and organizational models, the analysis of their content, and their relationship with audiences are among the main objects of research. These media constitute a fundamental sector in the current media ecosystem, which will require multidisciplinary and interdisciplinary perspectives in their research to face the challenges of digital media, digital native media and digital journalism.

Keywords

Digital native media; Digital journalism; Cyberjournalism; Legacy media; Literature review; Research; Media model; Media ecosystem; Digital communication.

1. Introduction

Almost three decades ago, in 1994, the first digital media were launched in several countries (**Salaverría**, 2019). The experiences of electronic journalism's precursors in web journalism (**Díaz-Noci**, 2013), such as the Bulletin Board System (BBS) offered through personal computers in the not-quite-Internet times of the online services of *CompuServe*, *Prodigy* and *America OnLine*, among others, contributed to many people becoming familiar with activities in a connected environment.

The rise of the Internet in the mid-1990s (**Scott**, 2005) encouraged many print media to migrate to the Internet –without much thought as to how– as an experience that allowed them to place their brand in a new communication space. It was the beginning of the journey into an unknown world, but one that promised adventure and engaged those who entered it.

The first generation of media on the World Wide Web (1993-2001), a stage in which digital native initiatives –news projects on the network that were not on any other medium– began to appear, showing the potential of online journalism (**Deuze**, 2001). Since the emergence in 1994 of unique experiences such as *Nando.net* –launched in Raleigh, North Carolina, as an internet service provider and beginning to offer news services based on *Gopher* and *Telnet* (**Carlson**, 2009)– the Internet scenario would host media initiatives that migrated to the web as well as digital native media. The first wave of native media arrived with websites such as *Salon* (1995), *Slate* (1996) and *Estrella Digital* (1998), and portals such as *T-online* (1995), *Yahoo News* (1995) and *MSN* (1999), which aggregated content from a variety of sources and were linked to other services such as email or search engines (**Nicholls**; **Shabbir**; **Nielsen**, 2016).

As the years went on, by the start of the new millennium and despite the impact of the dotcom crisis, the media map welcomed titles such as *Netzeitung* (2000), *El Confidencial Digital* (2000), *OhMyNews* (2000), *El Confidencial* (2001), *Huffington Post* (2005), *El Plural* (2005), *BuzzFeed* (2006), *Rue89* (2007), *Mediapart* (2008) and *PlayGround* (2009), and a new stage opened up these digital native media, with different models and news projects, some of them unique. Although not all of them survived and several had to overcome difficulties, their wake was followed by multiple initiatives in this third decade of the millennium. Their presence has become widespread in the communication ecosystem, and, in this phase, the sustained creation of digital native media emerges as a flourishing phenomenon that is expanding worldwide, with different maps depending on the country (**Salaverría**, 2020).

Today, the number of digital native media almost equals the number of legacy media in some countries. One of the case studies that confirms this trend is that of Spain, where, in 2021, there were 2,875 active cybermedia, of which almost half were digital natives (**Salaverría**; **Martínez-Costa**, 2021). Apart from the difficulties and the scarce financial muscle of many of these digital native initiatives, the fact is that these media are here to stay and their relevant role in the future of communication is confirmed by the most recent studies on digital journalism.

> *America OnLine*'s first newspaper service was launched by the *Chicago Tribune* in 1992

In the following section we will analyse the first studies that addressed digital native media and some publications and projects focused on them. Subsequently, we elaborate the systematized review on this object of study and address aspects that allow us to take steps forward in the research: its uniqueness, its location, and some trends.

2. The early days and scientific interest

Digital journalism is undergoing a process of constant change due to various factors, including the evolution of technology, platforms and the concept of audiences (**Steensen** *et al.*, 2019). The advent of the internet directly affected journalism, its standards and the profession as a whole (**Fortunati** *et al.*, 2009). The relationship that began with difficulty between new media and journalism became, over time, a symbiosis that makes it difficult for us to imagine today an exclusively *offline* journalism (**Siapera**; **Veglis**, 2012).

When novelty breaks through, labels emerge quickly, but it takes some time for definitive titles to consolidate. The debate around the terms used remains open, although some denominations have achieved greater acceptance, with nuances of meaning. For example, digital journalism understood as that which is developed with digital technologies versus cyberjournalism understood as that which is practiced in digital networks (**Salaverría**, 2019). Regarding the nature of the media, digital native media or native cybermedia are those designed and born for the internet, as opposed to legacy media (**Cebrián-Herreros**, 2009) or non-digital-native media, which derive from pre-internet brands that migrated to that space. Digital native media were also called online-native, digital-born, pure players or journalistic start-ups. Recently, **Steensen** and colleagues (2019) found in a meta-research study that the discursive shift towards the concept of digital journalism –rather than online, web or multimedia– marks a non-deterministic shift with a progressive abandonment of the focus on technology to focus on a journalism that shapes and is shaped by digital society, along with other social institutions.

In the first decade of the 21st century, **López** and colleagues (2005, p. 44) were already including in their study "national newspapers published exclusively online", citing the work of **Edo** (2002) and **Díaz-Noci** (2001). The path of native cyber-

media began with some unfulfilled promises of online news (**Quandt**, 2008), whose adaptation to the digital medium was not complete. The so-called journalistic start-ups had the opportunity to facilitate access to the

> In Spain almost half of all active cyber-media are digital natives

sector and the use of digital tools, but faced significant challenges such as a news market dominated by legacy media and a concentrated advertising market with poor performance (**Bruno**; **Nielsen**, 2012). Digital native media brought renewed approaches that eventually tended to formulate quality journalism and incorporate productive and organizational features of legacy media (**Wu**, 2016).

Scientific interest has grown around native cybermedia since the first publications analysed them, with a focus on the sustainability of the so-called *pure players* (**Sirkkunen**; **Cook**, 2012), in cases such as *Soitu* (**González**, 2010) or *El Español* (**Del-Arco-Bravo**; **Yunquera-Nieto**; **Pérez-Bahón**, 2015). This is evident in the design of competitive research projects focused on this object of study. For example, projects by *SembraMedia* or *DigiNativeMedia* at the *University of Navarra* and the *University of Santiago de Compostela* (2019-2021 and 2022-2025), which resulted in initiatives such as the *Inflection Point* report (*SembraMedia*, 2017; 2021), the publication of a monograph in the journal *Media and Communication* under the title *Digital Native News Media: Trends and Challenges*, edited by Ramón Salaverría in 2020, or the book *Medios nativos digitales en España: caracterización y tendencias* (**Salaverría**; **Martínez-Costa**, 2021).

3. Digital native media mapping and exploratory study

The growing interest in the study of digital native media encouraged the research of media ecosystems and the mapping of these initiatives in different countries and contexts. In recent years, digital media mappings have been developed with different objectives and methodologies, and many of them have been published openly on the web. Although their validity is temporary, they are a relevant tool to discover the scope of the growth of digital native media, study their characteristics or identify initiatives and innovation trends.

In Latin America in 2012, the *International Centre of Advanced Communication Studies for Latin America* (*Ciespal*) promoted the mapping of digital media in Ecuador (**Rivera-Costales**, 2012), where up to 254 media outlets were located, of which 34 were digital natives. More recent projects include the mapping of independent journalism in Brazil, an initiative of *Agência Pública* (2020), which offers a directory of digital native media that are not linked to large media groups, politicians or companies. In Peru, the *University of Piura* launched the *MediaMap Peru* initiative (2020) to identify all media, including digital natives, in the regions of Lambayeque, Piura and Tumbes. With an international dimension, *SembraMedia* (2022a) keeps its directory of Spanish-speaking digital native media updated, mapping up to 1,103 media in 24 countries. *Fundación Gabo* (2022) published research on digital native media in Latin America, mapping 1,521 media in 12 countries.

In the United States, media maps have also been developed with different objectives, allowing the presence of digital natives to be explored. An example is the research on Latino digital native media (**Wallace**, 2021), which identified up to 103 journalistic initiatives, or the project for media mapping and recognition of news deserts led by **Abernathy** (2020), which identified more than 500 local or national digital natives.

In the European context, it is worth noting the project that has mapped and studied the characteristics of up to 1,361 active digital native media in Spain (**Salaverría**; **Martínez-Costa**, 2021), which updates previous maps of digital media in the country (**Salaverría-Aliaga**; **Martínez-Costa-Pérez**; **Breiner**, 2018; **Salaverría**, 2005). With the focus on media of proximity, we find the map of local and hyperlocal digital media in Spain (**Negreira-Rey**; **López-García**; **Vázquez-Herrero**, 2020), the map of hyperlocals in the United Kingdom (*Independent Community News Network*, 2022), mostly digital natives, or the map of local media in France, which also identifies natives (*Ouest Médialab*, 2020).

With an international scope, the publication of the results of the *Oasis Project* (*SembraMedia*, 2022b) has been announced for 2023. Driven by *SembraMedia*, the *European Journalism Centre*, the *Google News Initiative*, *International Media Support*, and the *Global Forum for Media Development*, it aims to map and study digital native media organizations in 43 European countries. The data is expected to be published openly through an interactive map.

4. Systematized literature review

4.1. Material and review methods

To elaborate a complete and current state of the art on digital native media research, we opted to first conduct a systematized literature review (**Grant**; **Booth**, 2009; **Codina**, 2018) in the main scientific databases, *Web of Science* and *Scopus*, following the phases of search, evaluation, synthesis, and analysis. We designed a unique search equation that, adapting to the parameters of each database, provides the results we need, taking into consideration that this object of study relates to different, similar terms. Thus, we formulated the following query:

> "medios nativos digitales" OR "medio nativo digital" OR "cibermedio nativo" OR "digital native media" OR "digital-native media" OR "digital native news media" OR "digital-native news media" OR "digital-born media" OR "digital-born news media" OR "media start-up" OR "media start-up" OR "periodismo nativo digital" OR "digital native journalism" OR "digital-native journalism"

For *Web of Science*, the results were limited to the categories Communication, Information Science & Library Science and Social Sciences Interdisciplinary; for *Scopus*, Social Sciences. The results obtained (in April 2022) in this first step included 44 documents in *Web of Science* and 253 in *Scopus*.

> "Media maps allow the exploration of initiatives in different parts of the world"

Duplicate results were discarded and books, book chapters and proceedings were also excluded. In addition, a review of the topic was carried out through title and abstract as a first filter and full content in case of doubts for classification, ensuring that digital native media are part of the object of study, either as the main object or considering cases of this nature in the research. In total, 129 documents were discarded from the results that were initially obtained. Thus, the final sample considered valid was made up of 99 documents across *WoS* (7), *Scopus* (61) and in both databases (31). The selection of the *Web of Science* and *Scopus* databases limits the analysis of this literature review to scientific production with impact, but we tried to overcome this limitation in other sections of the article, where we include additional relevant publications on the subject.

4.2. Temporal evolution

The analysis of the selected papers according to the year of publication shows a general trend of a progressive increase in interest in digital native media in impact scientific research. The first papers were published in 2010 and 2012: a case study of the Spanish media *Soitu* (**González**, 2010) and an analysis of the mobile applications of digital news media (**Costa-Sánchez**, 2012), respectively. In 2015, two studies were published on entrepreneurial journalism (**Manfredi-Sánchez**; **Rojas-Torrijos**; **Herranz-De-La-Casa**, 2015) and a comparison of deontology in traditional and digital native media (**Suárez-Villegas**, 2015). It is clear that, from the very beginning, there has been a relevant interest in academia around digital natives –especially in Spain– although some pioneering works such as the definition of pure players (**Sirkkunen**; **Cook**, 2012), in this case published as a report, were left out of this review.

It was not until 2016 that we located articles by authors from other countries, such as studies on sustainability and business models (**Cook**, 2016; **Sakr**, 2016) or on hyperlocal media (**Chadha**, 2016a; 2016b). From 2018 onwards, the number of publications increased to 27 articles identified in 2020 and 2021.

The development over time also leaves evidence of the entry of certain perspectives in scientific research on digital native media. During the first years, special attention was paid to the characteristics and models of these media. The audience appears as an object of study from 2018 (**Mukerjee**; **Majó-Vázquez**; **González-Bailón**, 2018). From 2020, platforms (**Méndez**; **Palomo**; **Rivera**, 2020; **Vázquez-Herrero**; **Negreira-Rey**; **López-García**, 2022) and the profession (**Pereira**, 2020) were analysed.

4.3. Geographic scope

Another issue addressed in this review is the representativeness of the different geographical areas that have received attention in scientific articles on digital native media. Firstly, the international perspective of the studies is evident (34.3%): studying cases from several countries in different regions (21), Latin America (7), Europe (4) or Ibero-America (2). The remaining articles analyse a single country –among 18 from Europe, the Americas, Asia, and Oceania– with Spain (31) and the United States (10) standing out.

4.4. Object of study

We note that scientific research on digital native media has addressed multiple perspectives to achieve a comprehensive view, from the concept itself to its relationship with the platforms, the audience or issues about content and professional profile.

The first group of studies addresses the concept of digital native media (9.0%) and their characteristics (18.2%). The definition of digital native media has given rise to some debates in recent years, as **Salaverría** (2020) states in the editorial of the first monograph dedicated to this type of media, in the journal *Media and communication*, since different terms have been applied: born on the internet or digital-born, online-native, or pure (digital) players, even start-ups. Their 'recent' arrival in the media ecosystem posed a challenge to establish and legitimize themselves in digital journalism together with legacy media (**Stringer**, 2018). They have been considered alternative, in terms of financial and editorial independence, community service and other features, but they cannot be considered alternative or mainstream media in an absolute way, as **Harlow** (2021) points out in his article on digital natives in Latin America. On the other hand, the characteristics of these media have been explored from the perspective of formats (**Rojas-Torrijos**; **Caro-González**; **González-Alba**, 2020; **Romero-Rodríguez**; **Tejedor**; **Castillo-Abdul**, 2021; **Trillo-Domínguez**; **Alberich-Pascual**, 2020), positioning (**Lopezosa** *et al.*, 2020), innovation (**Valero-Pastor**; **García-Avilés**; **Carvajal**, 2021) or modalities such as data journalism (**Rivera**, 2021) and fact-checking (**Ufarte-Ruiz**; **Anzera**; **Murcia-Verdú**, 2020).

A second group of articles, regarding the object of study, compiles those that address different models: business model (14.1% of the total number of documents retrieved), entrepreneurship (11.1%) and proximity (4.0%). In search of sustainability, the research addresses their funding models (**Cook**, 2016; **Tejedor** *et al.*, 2020), including venture capital (**Kosterich**; **Weber**, 2018), foundations (**Ferrucci**; **Nelson**, 2019), branded content (**Carvajal**; **Barinagarrementeria**, 2021; **Zomeño**; **Blay-Arráez**, 2022) and the threat of failure (**Buschow**, 2020). They apply the idea of journalistic start-up (**Prasad**, 2021; **Valero-Pastor**; **González-Alba**, 2018), which expands the boundaries of journalism (**Chew**; **Tandoc**, 2022).

They also focus on entrepreneurship as a professional career opportunity (**Peinado-y-Miguel**; **Rodríguez-Barba**, 2020), on sports journalism (**Manfredi-Sánchez**; **Rojas-Torrijos**; **Herranz-De-La-Casa**, 2015) and as an experimental space for new approaches in journalism (**Ruotsalainen**; **Villi**, 2018). Regarding proximity media, the reviewed articles analyse local and hyperlocal media (**Chadha**, 2016a; **Lindén**; **Hujanen**; **Lehtisaari**, 2019; **Rivas-de-Roca**; **García-Gordillo**; **Caro-González**, 2020) in various regions.

The third group includes studies on content (17.2%), such as media coverage in digital native media of specific topics like climate change (**Painter**; **Kristiansen**; **Schäfer**, 2018) or elections (**Dennis**; **Sampaio-Dias**, 2021; **Thomas**; **Cushion**, 2019); similarly, studies appear that analyse both traditional media and digital native media (**Olveira-Araujo**; **Argiñano**, 2021), or that propose comparisons (**Coddington**; **Molyneux**, 2021; **Famulari**; **Hatley-Major**, 2022; **Quintana-Pujalte**, 2020).

Among other issues, digital native media have been addressed from the perspective of audience, platforms and profession. Audience research (12.1%) has dealt with consumption, comparing legacy and digital native media (**Majó-Vázquez**; **Nielsen**; **González-Bailón**, 2018; **Vara-Miguel**, 2020), engagement and participation (**Pröll**, 2017; **Sixto-García**; **Rodríguez-Vázquez**; **Soengas-Pérez**, 2020; **Stringer**, 2020) and the use of metrics (**Lamot**; **Paulussen**, 2020). The influence of social networks in the media ecosystem has also aroused interest in their relationship with digital native media, analysing how it affects management (**Méndez**; **Palomo**; **Rivera**, 2020), content production and distribution (**Hurcombe**; **Burgess**; **Harrington**, 2021; **Vázquez-Herrero**; **Negreira-Rey**; **López-García**, 2020) and their analysis (**Sixto-García**; **Rodríguez-Vázquez**; **Soengas-Pérez**, 2021). On the profession, the renewal of journalists from traditional media (**Pereira**, 2020), leadership in times of Covid-19 (**Appelgren**, 2021), diversity in the newsroom (**Khan**; **Haneef**, 2022) and digital identity (**Pérez-Díaz**; **Pedreño-Planes**, 2021), among other topics, have been analysed.

Table 1. Methods or approaches identified in the review of articles about digital native media

Method or approach	Articles
Content analysis	22
Data analysis	8
Documentary analysis	1
Theoretical discussion	2
Survey	5
Interview	17
Case study	17
Exploratory study	1
Focus group	1
Multiple methods	20
Not available	2
Observation	1
Other	1
Review	1

4.5. Methods and cases

Most frequently, articles apply multiple methods to approach the object of study, for example, combining content analysis with interviews, document analysis or participant observation. Of the 99 articles, 38 used interviews, 33 presented content and formal analysis, ten used observation and another ten used surveys. Among the studies employing only one method, those based on content analysis prevailed, followed by the case study and the interview. Table 1 details the methods used in the articles reviewed. Among the digital native media analysed, the following stand out: *El Confidencial*, *elDiario.es*, *El Español*, *HuffPost*, *BuzzFeed/BuzzFeed News*, *Vice/Vice News*, *De Correspondent* and *Mediapart*.

5. Comparative analysis: similarities and differences in the study of digital natives and legacy media

It is evident that traditional or legacy media and digital native media have numerous points in common, such as their purpose and core business. **Nicholls**, **Shabbir** and **Nielsen** (2016) note that both face similar challenges, especially in terms of financing and distribution.

The research developed so far points out differences that arouse interest in the uniqueness of digital native media, in structural aspects such as their principles or in more specific characteristics such as formats or content (**Salaverría**, 2020). On this last point, **Painter**, **Kristiansen** and **Schäfer** (2018) warn that a small number of studies comparatively analyse news coverage in digital native media and traditional media; among them **Thomas** and **Cushion** (2019), who point out the changes that originated among natives during election campaigns in the United Kingdom, although the norms and routines do not necessarily show a turn in the institutional logic of the media.

When digital native media began, they were unique due to the affordances of the technology they used and their business model. They emerged to provide answers to the market, to society and to journalism models, being created by experienced journalists with a trajectory in legacy media (**García-Orosa**; **López-García**; **Vázquez-Herrero**, 2020). **Harlow** (2021) points out that several digital native media in Latin America and their journalists are identified as alternative –in a renewed sense of the concept– for being different from the mainstream: they have financial and editorial independence, focus on other issues and audiences, and have an emphasis on community. This research opens a line of future research by focusing on the possible transformation of traditional media coverage under the influence of digital native media. Consequently, it shows the need to address the role of journalists, their professional profile, and the competencies at stake.

Digital native media are called on to take a step forward and embrace new products, new sources of income and alternative forms of organization; however, they face significant difficulties in sustaining themselves over time (**Buschow**, 2020). The recognized differences in business models, distribution strategies or editorial priorities are reflected, in turn, in the divergence of the types of users of traditional and digital native media (**Vara-Miguel**, 2020). Previous studies warn of the need to address relevant issues such as sustainability and audience.

The intense influence of technologies and platforms inevitably affects the digital media ecosystem. The article by **García-Avilés** and colleagues (2018) indicates that most of the initiatives that are part of their innovation index in Spanish media are organizations based on the internet or that consider it an essential source of support. Considering that journalistic innovation in that country appears on the margins of the traditional industry, they point out that it largely expands in digital natives, niche initiatives and start-ups.

6. Renewal of media models in digital natives

In addition to how digital native media adapt to and exploit the possibilities of the internet and platforms, and how this determines the quality or innovation of their content and formats, there are some particularities or challenges that have been identified as unique to them. Digital natives are often associated with a renewal of the traditional media model that affects the organization, financing and business model, the news mission or the way of understanding and managing the relationship with the audience. Some of the trends in research on digital natives are highlighted below, based on the results of the literature review and complemented by other relevant references in the field of study.

6.1. Local and hyperlocal

In recent decades, media of proximity have been renewed at an international level. After the crisis suffered by the traditional local press, digital native media with local and hyperlocal reach have experienced remarkable growth in many media contexts (**Harte**, 2013; **Kerkhoven**; **Bakker**, 2014; **Jangdal**, 2019; **Hujanen** *et al.*, 2019; **Dovbysh**, 2021; **Halvorsen**; **Bjerke**, 2019; **Downman**; **Murray**, 2017) and have been the subject of study in academia (**Negreira-Rey**; **López-García**, 2021). The intense growth of hyperlocal media has been linked to low barriers to create new media on the Internet (**Radcliffe**, 2012) and to entrepreneurial initiatives by local journalists (**Harte**; **Turner**; **Williams**, 2016). Although the condition of digital natives is not generally assumed to be necessary to categorize hyperlocal media, many of them are and there are authors who have defined them as such (**Metzgar**; **Kurpius**; **Rowley**, 2011).

Hyperlocal media have been the subject of specific maps and their characteristics and development trends have been studied and formed the central theme of some special issues (**Lindén**; **Hujanen**; **Lehtisaari**, 2019). Its often-blurred border with citizen journalism and the importance of the relationship with the community (**Jerónimo**; **Correia**; **Gradim**, 2020) has motivated research on the construction of the journalistic role of its promoters (**Chadha**, 2016a), the characteristics of their informative activity, the teams of hyperlocals or their management of user-generated content (**Chadha**, 2016b). Although studies often focus on the media ecosystem of a country or region, we also find international case studies (**Rivas-de-Roca**; **García-Gordillo**; **Caro-González**, 2020) or those that compare the situation of hyperlocals in several countries (**Cook**; **Bakker**, 2019).

6.2. Organization and business model

Regarding their organization, digital native media have experimented with productive structures or financing models that are not very common in traditional media. It has been observed that they are often more flexible organizations with multidisciplinary teams (**Valero-Pastor**; **González-Alba**, 2018), a characteristic that is related to the entrepreneurial nature of many projects.

At the financial level, digital natives present business models based on the principles of horizontality, participation, and user engagement (**Tejedor**; **Pla-Pablos**, 2020; **Tejedor** *et al.*, 2020), which seek diversification of revenue streams based on a value proposition and their own customer segment (**Sanders**, 2018). However, achieving economic sustainability is a challenge for many digital natives, either by developing their activity in an adverse context (**Cook**, 2016), lack of revenue diversification or insufficient resources (**Buschow**, 2020), the limited entrepreneurial experience of their promoters or the lack of economic support networks (**O'Brien**; **Wellbrock**, 2021).

6.3. Relationship with the audience

The foundational principles of digital natives tend to place value on journalistic ethics and commitment to the audience (**Ruotsalainen**; **Villi**, 2018), accountability, responsibility, and transparency of their operations (**Pérez-Díaz**; **Zamora-Medina**; **Arroyas-Langa**, 2020). These media face the challenge of gaining the trust of their users, who still tend to prefer traditional media brands (**Vara-Miguel**, 2018).

Understanding audience behaviour in the digital environment is another challenge for digital native media and researchers in this field. From academia, different methodologies have been defined to standardize the study of user behaviour and its metrics (**Majó-Vázquez**; **Nielsen**; **González-Bailón**, 2019) or to analyse phenomena such as virality (**Stringer**, 2020). The editorial management of audience measurement has also been analysed, noting that digital natives tend to prioritize editorial criteria over metrics (**Greene**; **Lecaros**; **Cerda-Diez**, 2022), although their managers recognize that these support journalistic work and allow better planning of content production and distribution (**Lamot**; **Paulussen**, 2020).

7. Challenges for digital native media and their study

The evolution of the digital communication ecosystem and the logical reconfiguration of media models have led to an international phenomenon of growing digital native media. While digital native media were almost experimental news initiatives in the 1990s, in the third decade of the new millennium they have become an essential sector in the media

maps of many countries. This transformation of the media reality is reflected in the field of research, with the study of digital native media being a growing area.

Most digital native media are still very similar to and inspired by legacy media, which have served as a model and whose heritage they try to give continuity to (**Nicholls**; **Shabbir**; **Nielsen**, 2016). However, their digital nature has forced them to introduce new dimensions and to experience renewed territories. Their production structures are often more flexible and adaptive, which favours innovation in content, in dissemination on different platforms and in the relationship with the audience (**Harlow**; **Salaverría**, 2016; **García-Orosa**; **López-García**; **Vázquez-Herrero**, 2020; **Sixto-García**; **Rodríguez-Vázquez**; **Soengas-Pérez**, 2020).

The profound transformations of the communicative ecosystem confront digital natives with important challenges, such as adaptation to large platforms and social networks (**Bell** *et al.*, 2017), the loss of credibility and trust of the citizenry in the media (**Fisher**, 2016; **Vázquez-Herrero** *et al.*, 2022), misinformation (**Billard**; **Moran**, 2022), news avoidance and rejection (**Edgerly**, 2021) or the preservation of journalistic quality (**Rodríguez-Hidalgo**; **Rivera-Rogel**; **Romero-Rodríguez**, 2020). In this context, digital native media continue the search, already started by legacy media corporations, to find sustainable models. Sustainability is a challenge at the economic and management levels (**Vara-Miguel** *et al.*, 2021) –to develop profitable, transparent models that favour news independence (**Riordan**, 2014)– but also at the social level, to build projects that involve communities and manage to position themselves as reliable news media at the service of citizens (**Arrese**; **Kaufmann**, 2016; **Kalogeropoulos** *et al.*, 2019; **Sixto-García**; **Rodríguez-Vázquez**; **Soengas-Pérez**, 2020; **Ferrucci**, 2017).

It can be noted that there is no single path to success for digital native media, although some initiatives mark innovative paths to follow. The study and research of native cybermedia requires a dual dimension: the study of their types and characteristics –since in many fields new actors from the field of communication are incorporated and the boundaries of journalism are questioned (**Carlson**; **Lewis**, 2015)– and their comparison with legacy media. Likewise, metajournalistic and multidisciplinary and interdisciplinary approaches should contribute to tackling the challenges of digital media, digital native media and digital journalism.

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Revenue diversification strategies of online news organisations: subscriptions and memberships

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Abstract

The funding model crisis for newspapers is a matter of public concern; and it is not only a business issue, but also a social and political one, as news organisations are considered to have an irreplaceable function in democratic systems. Technological and social changes have transformed the business model of news organisations so that, in a digital scenario with a strong competition for consumers' attention, they have had to diversify their portfolio of income streams. In such a context, this study analyses the state of the diversification of revenue streams in the Spanish digital media market, using the available data from the total universe of digital media in the country. The article focusses on the two most common revenue streams related to user payment -subscriptions and memberships- and analyses the importance of four variables in this diversification of revenue strategies: their nature (digital native versus traditional), thematic scope (general versus specialised), territorial scope (local versus national), and the type of organisation that promotes it (traditional, new, or independent groups). The data obtained suggest that there are no universal formulae in the implementation of payment models for Spanish digital media. Specifically, there are significant differences in the revenue models between native and non-native digital media. Thus, payment strategies are more prevalent among non-native digital media than among native media. Furthermore, the non-native media that have opted for paid models tend to diversify their sources of income more than the non-native ones based on free model. Additionally, data show that paywalls and memberships are more usual among specialised non-native digital media and generalist native outlets. Also, payments are more often required by local and regional media than national outlets. From the ownership point of view, although the main Spanish media corporations are developing their revenue models, the pay-per-content model is also quite extended among organisations, associations, and foundations not linked with the traditional publishing groups. This study, due to its exhaustiveness, dimensions, and novelty, identifies in detail the current state of the implementation of the pay model for digital media in Spain, which can help and facilitate media managers in their decision-making.

Keywords

Digital media; Digital journalism; News organisations; Business models; Revenue; Revenue strategies; Subscriptions; Memberships; Digital-native media; Traditional media; Local news media; National news media; Specialised news media; Generalist news media.

1. Introduction

Technological and social changes have transformed the business model of news organisations. As advertising revenues were not enough to make most media companies sustainable, they have diversified their portfolio of income streams with other types of sources, such as branded content, online commerce, a supply of additional products and services, institutional grants and subsidies, donations by individuals, and paying for digital news content (**Olsen**; **Kalsnes**; **Barland**, 2021; **Vara-Miguel** *et al.*, 2021).

The funding model crisis for newspapers is a matter of public concern; it is not only a business issue, but also a social and political one. News organisations are considered to play a crucial function in democratic systems (**Sjøvaag**, 2019). First, they are providers of relevant and useful information for citizens to make better decisions. Second, they can expose corruption and the mishandling of power perpetrated by politicians and corporations (**Baker**, 2022).

Among all the ways media organisations have diversified their revenue streams, the introduction of online readers' payments, in the form of subscriptions and memberships, has been foremost in capturing the attention of media managers and scholars (**Barland**, 2015). This emergence of paywalls has evidenced a shift from the advertising model to reader revenue (**Chyi**; **Ng**, 2020), which makes the news industry less dependent on advertising and print product (**Olsen**; **Kalsnes**; **Barland**, 2021). According to the global *Digital News Report 2021*,

> "[2020] has also seen more quality journalism go behind paywalls, as print and digital-born publishers turn to subscription, membership, and donations to reduce their reliance on advertising –which online continues to go primarily to *Google* and *Facebook*" (**Newman** *et al.*, 2021, p. 14).

Spain has not been an exception, and in 2020, many of the largest Spanish print news organisations and digital-native sites erected paywalls, with relative success (**Vara-Miguel**, 2021; 2022).

The new revenue model can be understood in the context of a generalised fall in print sales and advertising revenue in the Spanish media market (*PriceWaterhouseCoopers*, 2021; *Infoadex*, 2021). Nevertheless, the main challenge for news organisations is how to battle the widespread reluctance to pay for digital news by most of the users (**Nielsen**, 2019; **Newman** *et al.*, 2021), and how to avoid losing audiences to free competitors when online newspapers establish a paid-for model.

As the literature review will show, there are hardly any studies that have analysed the existence (or not) of common characteristics in news companies that have opted for a payment model. This paper aims to delve into the study of Spanish digital media that offer a payment model to their readers. The objective is to fill the gap that exists in the literature on those common characteristics in news organisations with payment models, either subscription or membership. In particular, this study will pay special attention to the differences that may exist between all the native digital media and non-native media, but also it will analyse the differences between specialised and generalist outlets, between local and national digital media, and between those with a different type of ownership.

Based on existing research literature we introduce our research questions, we explain our methodological approach, and justify the analysis of the Spanish case. In the final sections, we present our findings and discuss their implications.

2. Literature review

The crisis of the traditional business model of news organisations, based mainly on advertising revenues, has severely damaged their financial results during the last decades. News organisations around the world should pursue their own business model innovations through trial-and-error tactics (**Goyanes**; **Vara-Miguel**, 2017). In an attempt to attract new sources of income to ensure their sustainability, many news companies have tried to obtain funds from the payment of readers after many years when digital media eliminated the need to pay for digital news and offered it free of charge, as it was expected that advertising and ecommerce could offset the cost (**Arrese**, 2015; **Goyanes**; **Vara-Miguel**, 2017; **Picard**, 2017).

When it was clear that these two revenue streams could not provide news organisations with profits (**Goyanes**; **Dürremberg**, 2014; **Mathiasová**; **Solík**; **Mináriková**, 2022), companies tried charging directly for digital media access. Direct charge is understood as any one-off or periodical contribution by users to the news organisa-

> Non-native news media (77.5%) are implementing paywalls (soft or hard) and memberships more often than digital natives (22.5%)

tion, in return for access to content or any other kind of benefit. It has adopted very different forms. Some of the most popular ones have been the payment for unit, or micro-payment, subscriptions (individual or bundled ones), memberships and donations.

Regarding subscriptions, their most usual way has been the creation of paywalls, where content is partially (soft paywall) or totally (hard paywall) locked behind a payment obligation (**Picard**, 2017). According to **Simon** and **Graves** (2019), almost 70% of the 200 most important newspapers from Europe and the US have implemented some kind of paywall.

However, the main challenge for news organisations is how to battle their audiences' reluctance to pay. Willingness to pay for digital news remains low in most countries. **Newman** *et al.* (2021) found out in 2021 that only 17% of users said they paid for online news, up a mere five percentage points since 2016 (**Newman** *et al.*, 2021). In Spain since 2018 this has remained quite steadily around 12% of online news media users (**Vara-Miguel**, 2022).

Most of the research about paying for news gravitates around three issues.

- First, scholars have described the state of payment in several media markets. Special mentions must be made of the annual *Digital News Report* by the *Reuters Institute of the Study of Journalism*, from 2014 to 2022, but also other studies at the USA (**Chiou**; **Tucker**, 2013; **Holm**, 2016; **Pickard**; **Williams**, 2014; **Cook**; **Attari**, 2012; **Estok**, 2011); Australia (**Carson**, 2015; **Myllylahti**, 2014); Norway (**Sjøvaag**, 2016; **Kvalheim**, 2013); Spain (**Goyanes**; **Dürremberg**, 2014); Germany (**Brandstetter**; **Schmalhofer**, 2014) or Latin America (**Tejedor** *et al.*, 2020).
- Second, the research has focussed on predictors affecting the willingness to pay (**Chi**; **Ng**, 2020; **O'Brien**; **Wellbrock**; **Kleer**, 2020; **Kim** *et al.*, 2021a).
- And finally, studies on factors that influence the reluctance to pay (**Groot-Kormelink**, 2022; **Chyi**; **Tenenboim**, 2019; **Fletcher**; **Nielsen**, 2017; **Goyanes**; **Demeter**; **De-Grado**, 2022).

In their literature review, **O'Brien**, **Wellbrock** and **Kleer** (2020) analysed 17 factors that influence past payment (PP), paying intent (PI, whether people would pay) and willingness to pay (WTP, how much people would pay) classified into consumer-based, product-based, and economic factors. The authors suggest that

> "gender (being male), education, media use, news interest, format/medium (print or bundle), customization/personalization, (perceived) quality, specialization/niche (e.g., local) and income have a positive impact on at least one of the three dependent variables PP (past payment), PI (paying intent), and WTP (willingness to pay)" (**O'Brien**; **Wellbrock**; **Kleer**, 2020, p. 663).

On the other hand, the mentality of free availability is the main reason for not paying for digital news (**Himma-Kadakas**; **Kõuts**, 2015; **Fletcher**; **Nielsen**, 2017; **O'Brien**; **Wellbrock**; **Kleer**, 2020; **Goyanes**; **Demeter**; **De-Grado**, 2022). More recently, **Kim** *et al.* (2021a) proposed a model that identifies factors contributing to people's negative experiences on local news websites, and how the use of each element influences cancellation of digital subscriptions as a way to detect the source of churn and prevent subscribers from dropping out. These authors found that regularity (but not intensity) of reading, reading local news content, and newsletter subscriptions were also negatively related to local newspaper cancellation. Finally, **Chyi** and **Yang** (2009) and **Kim** *et al.* (2021b) concluded that online news is perceived as less valuable than print news, and as people's income increases, their payment for online news decreases.

While subscription models have been widely researched during the last years, membership and donations are still a phenomenon open to further attention and exploration from media management researchers (**Gordiienko**, 2021; **Regner**, 2021). From a cultural perspective, while subscription is seen as an individual personal decision based on personal preferences, membership is perceived more as a civic or social duty to support a media outlet's existence (**Regner**, 2021). It is not rare to find that media supported by membership initiatives offer free content, that is not protected behind a paywall, as is the case with *The Guardian* in the UK or *ElDiario.es* in Spain.

3. Charging for news: the supply side view

As seen, research focussed on the intention to pay for news has been abundant, but there are not many studies focussed on the payment situation from the point of view of supply, as the majority of the literature has been centred on how readers react to paywalls and the main factors affecting payment for digital news. More specifically, there is hardly any research on the similarities and differences between the digital media that have opted for charging for news.

Native and non-native digital media differ in their business models, distribution strategies, corporate organisation, and editorial priorities (**Nichols**; **Shabbir**; **Nielsen**, 2016). Digital natives operate exclusively online, and they have explored new sources of financing that differ from the traditional ones to guarantee their sustainability (**Cook**; **Sirkkunen**, 2013),

despite the fact that many of them are run by founders with few managerial skills, who lack the knowledge to implement new revenue streams (**Salaverría**; **Martínez-Costa**, 2021). On the contrary, non-native digital newspapers gain additional finance from the print business, making their brand and leading position in the markets their main competitive advantage (**McDowell**, 2011). Moreover, by including quality as part of their brand identity, non-native outlets find an audience that is ready to pay money for –or at least attention to– this sort of coverage (**Siegert** *et al.*, 2015; **Arrese**; **Kaufmann**, 2016; **Vara-Miguel**, 2020).

In the specific case of the Spanish market, the data offered by **Vara-Miguel** *et al.* (2021) showed that although there is a larger percentage of non-native media without any specific income stream (12.6%), digital-native media use fewer sources of revenue than non-native media: 18.3% of non-native media use three or more sources, and this figure is only 11.8% of digital natives (**Vara-Miguel** *et al.*, 2021). This paper will exclusively analyse the digital media that are totally or partially financed by payment, that is, 16.2% of the Spanish digital market.

First, the paper will present analysis of the degree of diversification of financing sources in both groups, namely native and non-native media. The most widespread opinion among scholars in media economics is that diversification is the most successful way of reducing the risk of losses and increasing the returns of the firm (**Picard**, 2011). Some scholars have recently studied the types of funding diversification present in the news markets in several countries (**Nel**, 2010; **Medina-Laverón**; **Sánchez-Tabernero**; **Breiner**, 2021; **Cornia**; **Sehl**; **Nielsen**, 2016; **Jenkins**; **Nielsen**, 2020; **Tejedor** *et al.*, 2020). These revenue sources include e-commerce, business-to-business services, events, merchandising, and crowdfunding, to mention a few.

The present study is concerned with the general extent of revenue diversification in the digital media industry, and specifically in digital media with a reader payment model. Research on the logic of diversification among digital-native media is not conclusive. While **Massey** (2018) found that for-profit news sites perform the best with scant revenue diversity (**Massey**, 2018), **Tejedor** *et al.* (2020) concluded that the most sustainable digital-native media use three or more revenue streams. This finding is also supported by **Medina-Laverón**, **Sánchez-Tabernero** and **Breiner** (2021). On the other hand, as non-native media traditionally get their revenues from print and digital operations, by turning their business model from a print-only to a hybrid print-and-digital model, they are not so much in need of diversifying their revenue sources. Also, their leading position in their markets makes them less dependent on other funding sources (**Pickard**; **Williams**, 2014). Finally, **Olsen**, **Kalsnes** and **Barland** (2021) found out in their analysis of the Norwegian market that

> "contrary to revenue diversification theory which holds that diversification stimulates economic growth, the increased level of revenue diversity in the newspaper industry coincides with a lower total revenue" (**Olsen**; **Kalsnes**; **Barland**, 2021, p. 14).

All these ideas drive us to the following research question:

> RQ1: Do native and non-native digital media have different degrees of diversification of funding sources?

Offering unique and differentiated content that is not imitable by competitors is the main sales argument to get readers to pay for news (**Kim** *et al.*, 2021a; **Vara-Miguel**; **Breiner**, 2021; **Myllylahti**, 2017). This exclusivity is understood in various fields ranging from the hyper-specialisation of content (a niche market) that is only accessible to a specific sector, committed to the principles that identify the group (**Marta-Lazo**; **Segura-Anaya**; **Martínez-Oliván**, 2017). Media scholars have found that charging for news is possible only if dissimilar and specialised content is offered by digital media and it cannot be easily imitated by competitors, when news dealing with less specific issues is usually free (**Vara-Miguel**; **Sanjurjo-Martín**; **Díaz-Espina**, 2014; **Myllyathi**, 2017). Furthermore, outlets covering more differential and exclusive issues could segment their audiences and advertisers better, thus increasing their advertising and sales revenues more efficiently, while general news sites remain oriented to capturing massive audience numbers. Therefore, according to previous studies, the pay-for-content model is likely to be more widespread among specialised digital media than among generalist ones. Thus, we propose the following question:

> RQ2: Do specialised digital media in Spain use more revenue payment methods than the generalist ones?

The nature of local or regional news organisations, whose uniqueness lies in their ability to offer content closer to the reader in a more efficient, useful, and complete way, makes it more favourable for them to experiment with paying for news (**Franklin**, 2006). We understand local-regional journalism as news produced for and about the very local or regional level across a range of media platforms, including online, radio, and print (for a wider debate about the term, see **Negreira-Rey**; **López-García**; **Rodríguez-Vázquez**, 2020).

Scholars have found that local-regional journalism is among the most diverse subfields in terms of ownership, editorial formats, distribution strategies, and business models that sustain it (**Hess** *et al.*, 2017). Although advertising remains the major source of income for these local news organisations (**Abernathy**, 2014; **Vara-Miguel** *et al.*, 2021), the increasing decline in advertising revenues is shifting media managers to alternatives as charging for news (**Goyanes**, 2014). In Spain, most digital-native sites have a local reach, and the companies publishing them hardly attain economic profitability: 61% had revenues below 100,000 euros, which forces them to diversify their sources of funding (**Negreira-Rey**; **López-García**; **Rodríguez-Vázquez**, 2020; *APM*, 2017).

The paywall model for digital local media has the advantage of offering niche content not covered by national media, but local media must deal with several disadvantages.

- First, the size of their markets is smaller than that of national-scope outlets, and this forces them to diversify their revenue streams, adding models such as subscriptions, crowdfunding (**Tejedor**; **Pla-Pablos**, 2020) or alliances with other companies to pursue common objectives, such as networks of local media (**Negreira-Rey**; **López-García**; **Rodrí-guez-Vázquez**, 2018) or media co-operatives (**Barranquero-Carretero**; **Sánchez-Moncada**, 2018).
- Second, most of their founders pursue more social and civic aims rather than economic ones, and they rely on civic cooperation to create content (**Negreira-Rey**; **López-García**; **Rodríguez-Vázquez**, 2020).

Thus, although charging for content drives additional revenues for local outlets, paywalls or memberships do not usually offer a viable funding model in the short term (**Myllylahti**, 2014).

RQ3: Do local-regional digital media in Spain use more revenue payment methods than the national outlets?

An under-researched aspect is the potential relationship between subscription and membership models and the type of media organisation. Those who have addressed this question have mainly used a case study perspective (**Carson**, 2015; **Holm**, 2016; **Pickard**; **Williams**, 2014; **Cook**; **Attari**, 2012; **Estok**, 2011; **Brandstetter**; **Schmalhofer**, 2014; **Kvalheim**, 2013; **Myllylahti**, 2014). This variable could be relevant, as it potentially affects the strategy implementation. The leading media corporations dominate the advertising and subscriptions market because of their experience, the strength of their brands, and their larger human and financial resources. They base their strategy on general-interest editorial propositions, high market shares, large numbers of journalists, and a high dependence on advertising (**Medina-Laverón**; **Sánchez-Tabernero**; **Breiner**, 2021). On the other hand, as the production, distribution, and marketing costs have been reduced dramatically due to innovation, digital technology allows digital-native media to achieve greater cost efficiency than legacy companies. However, developing and implementing new funding streams requires the capacity to invest in people, technology, and marketing, and smaller digital media usually do not have such strong resources. Taking a closer look at the type of media company (national legacy firms, regional legacy firms, new native firms, specialised firms, or other) with a paywall or membership model will help to answer some questions:

RQ4: Is there any relationship between the type of media firm and the implementation of payment strategies?

4. The Spanish context

The Spanish market has stepped on this trend, and the main publishers have included paywalls and memberships in their portfolio of revenue streams. Spain is a particularly interesting case study for several reasons:

- First, the circulation of newspapers has dramatically collapsed from a penetration of 42.1% in 2008 to 18% in 2020 (*AIMC*, 2021), and currently no Spanish newspaper sells more than 100,000 daily copies. In parallel, newspaper advertising revenues fell from 1,900 million euros in 2007 to just 317 million in 2020 (*InfoAdex*, 2009-2021).
- Second, the Spanish news market stands out because of a strong local-regional press, that represents two thirds of newspaper circulation in the country (**Salaverría**; **Gómez-Baceiredo**, 2017). As we are about to show, this predominance of regional newspapers has spread to the digital market, strongly supported both by the audiences' interests and by public subsidies and grants. Spain has a long history of a public subsidy system for regional and local newspapers (**Nielsen**; **Linnebank**, 2011; **Vara-Miguel**; **Breiner**, 2021).
- Third, Spain is one of the most prolific countries in developing online news outlets. According to data by researchers of the *Diginativemedia* project, 3,949 news sites were found in Spain in April 2021, of which 72.8% were active (updated in the last three months) (**Negredo**; **Martínez-Costa**, 2021). As **Salaverría** and **Martínez-Costa** (2021) state, between 2008 and 2015, more digital-native news media were launched than in any other previous period, and several of them achieved renown and influence as so-called legacy journalism outlets. In their comprehensive analysis of the funding sources of 2,784 Spanish digital media, **Vara-Miguel** *et al.* (2021) concluded that traditional, national, and specialised online media have a broader and more innovative revenue mix than digital-native, regional, or local and general-interest news outlets.

Finally, the Spanish market has seen a significant increase in the supply and demand of digital subscriptions. Since 2020, almost all general daily news titles with a national scope, and the main regional newspapers, have chosen to adopt models based on users paying for full digital news access: according to data reported by the industry, there are more than 775,000 subscribers in the Spanish market, although according to *Digital News Report España* 2022 (**Vara-Miguel** *et al.*, 2022) the country still shows low willingness to pay for digital news (12% of Spaniards paid for online news in the last year).

> Digital-native news media have a more diverse revenue stream portfolio than non-native media: 65.1% of them have a combination of three or more revenue streams against 56.7% of non-native media

5. Methodology

5.1. Mapping digital media

This work was part of a project that aimed to create a full database of digital news media in Spain, which the research team is understood to have accomplished in April 2021. The research team interprets 'digital news outlet' as a journalistic publication with autonomous brand identity and content, established in Spanish territory or with a specific edition for Spain. All cases reported correspond to digital news media in Spain that had been updated with new editorial content at least once in the three months prior to observation. That was the requisite for an outlet to be considered 'active'; otherwise, it was classified as 'inactive', and was excluded from the results we present here.

Out of a total of 3,949 news sites, the research project found 2,874 active sites, and 1,075 inactive sites; the latter were left out of the analysis for this article. Among the active sites, 1,361 (47.36%) were classified as digital-native, and 1,513 (52.64%) were found to be non-digital-native (**Negredo**; **Martínez-Costa**, 2021). This key distinction between digital-native and non-native sites depends on whether they

> "started their core activity on the Internet from the moment when they were established, no matter if they started some kind of print or broadcast edition, simultaneously or afterwards" (**Negredo**; **Martínez-Costa**, 2021, p. 35).

In order to identify media outlets as digital-native, it was assessed as to whether their core activity was online since they were established, even if they had promoted some offline activity afterwards (**Salaverría** *et al.*, 2019; **Negredo**; **Martínez-Costa**, 2021).

5.2. Categories and variables

The information was collected by a team of coders. Basic information that could be observed directly and reproduced from the website, such as the brand title, URL, location, or publishing group, were entered directly into the database, whereas the sources of income were subject to inter-coder agreement tests.

Three coders assessed the presence or absence of the variables describing sources of revenue in each entry in the database. For all variables, any indication of the presence of the revenue stream in the site's business model was to be coded as 'Yes'. Coders were asked to look at the sites' whole home page, including links to pages with more details about these revenue opportunities. If the organisation mentioned a source of revenue –even if there were no active campaigns of this kind on the home page– 'Yes' was coded to indicate their presence.

For the purpose of the study's replicability (beyond the justification for the categories that we developed in the previous section), the following paragraphs summarise the criteria stated in the codebook that were applied by the coders to all the cases.

Payments, subscriptions, and memberships are any one-off or periodical contributions by users to the news organisation, in return for access to content or any other kind of benefit. This category includes the kinds listed below. If any of these payment types were available from the site's home page, the category was coded as present on the site.

- Paying for digital units: paying to access an article, an issue, or all of the content for a single day.
- Simple subscriptions: monthly, quarterly, or annual payments for access to the content (possibly including the website, an app, and/or PDF editions).
- Combined subscriptions: paying for access to the online service and for a print copy of the brand's periodical publication, be it daily, weekly, fortnightly, monthly, quarterly, biannual, annual, and so on.
- Bundled subscriptions: access to news included with some other kind of payment or subscription to a different non-publishing service (telephone service, Internet access, pay television, any other device, product, or service).
- Membership of a community of users or readers: the user pays to be part of a community of readers; unlike subscriptions, which give users access to content in exchange for their payment, membership is a relational concept, as people make a periodical economic contribution because they agree with a news organisation's point of view, its ideology, its mission, and not to gain access to paywalled content, because access to the whole editorial offer remains unrestricted for non-members, under this revenue model. Paying members usually receive some benefits, such as early access to content, highlighted comments, or even the ability to comment.

Apart from revenue streams, other key distinctions we will draw are based on the topic scope of each site. The topic scope establishes two categories: general news and specialised content. Sites with general-interest news coverage and those dealing with a variety of topics were classified as general news, even if some of them may serve a local area or a certain demographic. Outlets with an identifiable focus on a topic or subject area were classified under the specialised label.

> Paywalls and memberships are more usual amongst specialised (52.6%) than generalist (47.4%) media

5.3. Inter-coder agreement tests

Inter-coder agreement tests were based on a subsample of 350 brands, representative of the whole census of news websites, with a margin of error of ±5% at a confidence level of 95%. All cases were sorted using our internally assigned ID, and the first ten sites every one hundred were included in the subsample for the test. In the case of revenue streams, three coders worked independently on the test sample, coding each case separately. Later, results were compared. Cohen's Kappa coefficients of agreement were calculated for each pair of coders and each source of revenue. The formula by which Cohen's Kappa coefficients are calculated includes a correction that discounts agreements that may have been reached by chance. The results can be found in Table 1. According to the usual parameters of this statistical measurement (**Abraira**, 2000) a good level of agreement was reached (K ≥ 0.6) in all cases.

Table 1. Cohen's Kappa coefficient of agreement for each pair of coders

Type of sources of revenue	Coders A–B	Coders A–C	Coders B–C
Pay, subscriptions, memberships	0.76	0.85	0.78

In any case, all discrepancies were solved by assigning a definitive category after discussion and agreement between the coders. They also formulated suggestions and specifications which were then incorporated into the codebook. Finally, the full database of sites was coded. The remaining list of cases was evenly distributed among the three different coders.

6. Findings

Regarding the diversification strategies of digital media with paywalls or membership strategies (n = 458), data shows that non-native news media (77.5%) are implementing paywalls (soft or hard) more often than digital natives (22.5%). In total, 355 non-native media outlets offer some payment plan to their users, and 103 digital natives also do this.

Digital-native news media have a more diverse revenue stream portfolio (χ^2 (4, N = 458) = 12.634, p < 0.050). As Table 2 shows, 43.4% of non-native media have activated some pay-per-content option (*vs* 35% of digital-native outlets doing this), besides advertising or instead of it. Most of the digital-native media outlets (65.1%) have a combination of three or more revenue streams against 56.7% of non-native media.

Table 2. Number of revenue sources. Base: media with reader revenue (n = 458)

Number of sources	Total		Non native		Digital native	
	N	%	n	%	n	%
1	23	5.0	19	5.4	4	3.9
2	167	36.5	135	38.0	32	31.1
One or two	190	41.5	154	43.4	36	35.0
3	164	35.8	122	34.4	42	40.8
4	90	19.7	73	20.6	17	16.5
5	14	3.1	6	1.7	8	7.8
Three or more	268	58.6	201	56.7	67	65.1
Total	458	100	355	100	103	100

Regarding the topic scope (generalist *vs* specialised), the data shows that paywalls and memberships are more usual amongst specialised (52.6%) than generalist (47.4%) media. However, results from the chi-squared test of independence show that there are significant differences between non-native and digital-native media, χ^2 (1, N = 458) = 4.251, p < 0.050. As can be seen in Table 3, most digital natives implementing some pay-per-content strategy are generalists (56.3%). It is just the opposite in the case of non-native news media, where paywalls are more usual amongst specialised outlets (55.2%) than generalist ones (44.8%).

Table 3. Type of coverage. Base: media with reader revenue (n = 458)

Type of issues	Total		Non native		Digital native	
	N	%	n	%	n	%
General news	217	47.4	159	44.8	58	56.3
Specialised news	241	52.6	196	55.2	45	43.7
Total	458	100	355	100	103	100

Focussing on such specialised media (n = 241), the chi-squared test of independence does not show significant differences between non-native and native media. Amongst non-native media, technical and professional-oriented media outlets offer paid content to their readers more often (18.4%), followed by cultural ones (10.2%). On the other hand, in the case of digital natives, the ones implementing paywalls are those specialising in the economy and finance (15.6%), followed by leisure and entertainment (11.1%).

According to their territorial coverage (national *vs* local), payments are required more often by local or regional digital newspapers (54.6%) than national ones (45.4%) (see Table 4). Again, the chi-squared test of independence shows some significant differences between non-native and digital-native media: χ^2 (1, N = 458) = 1.957, p < 0.000. Most non-native regional or local news media have some pay-per-content strategies (56.3%), while in the case of digital natives it is just the opposite: the majority of those requiring some payment from their audience have national coverage (51.5%).

Table 4. Type of scope. Base: media with reader revenue (n= 458)

	Total		Non native		Digital native	
Scope	**N**	**%**	**n**	**%**	**n**	**%**
National	208	45.4	155	43.7	33	51.5
Local-regional	250	54.6	200	56.3	50	48.5
Total	458	100	355	100	103	100

A more detailed analysis allows us to identify the provinces where these media outlets with payment methods are published: Madrid (35%) and Barcelona (18.3%) are where most of them are concentrated. A Coruña (5.5%), Guipúzcoa (4.6%), Valencia (3.5%) and Navarra (3.1%) are also relevant places in this list that constitutes up to 70.8% of digital news outlets with some payment plan.

Table 5. Distribution of digital media with paywalls or membership plans, by regions (selected cases). Base: media with reader revenue (n = 458)

	Total		Non native		Digital native	
Region	**N**	**%**	**n**	**%**	**n**	**%**
Madrid	164	35.8	118	33.2	46	44.7
Barcelona	84	18.3	63	17.7	21	20.4
A Coruña	25	5.5	22	6.2	2	2.9
Guipúzcoa	21	4.6	15	4.2	6	5.8
Navarra	14	3.1	10	2.8	4	3.9
Valencia	16	3.5	15	4.2	1	1.0
Total	324	70.8	243	68.3	80	78.7

The concentration is even higher between digital-native and non-native publications (see Table 5). Madrid contains 44.7% of digital natives with payment options, followed by Barcelona (20.4%). The six regions in the list make up 78.7% of digital-native and 68.3% of non-native media outlets with payment strategies.

The last analysis has been performed taking into account the type of media organisation that supports these digital outlets. In this case, the existing corporations in the Spanish media market have been sorted into four categories: traditional national media groups (*Prisa*, *Unidad Editorial*, *Atresmedia*, *Mediaset*), traditional regional/local media groups (*Vocento*, *Prensa Ibérica*, *Godó*, *Promecal*, *Joly*, and *Corporación La Voz*), new emerging groups (*Titania*, *ElDiario.es*, and *El León del Español*) and specialised magazine groups (such as *Conde Nast*, *Hearst*, *Motorpress*, and *Zinet*). There is a fifth category, 'Other', including independent local media companies, associations, and foundations that usually publish just one media outlet.

According to Table 6, the majority of digital media implementing pay-per-content strategies are owned by organisations, associations, or foundations not linked to traditional publishing groups (57.7%). Traditional regional/local media groups are next (20.2%), followed by specialised magazine groups (10.7%) and traditional national media groups (6.6%). At the end of the list there are the new emerging groups that usually have national coverage (4.8%). However, again, digital-native and non-native outlets show significant differences (χ^2 (4, N = 392) = 71.260, p < 0.000).

> The majority of digital media implementing pay-per-content strategies are owned by independent organisations, associations, or foundations (57.7%), followed by traditional publishing groups (20.2%)

Table 6. Types of media groups. Base: media with reader revenue (n = 458)

Group	Total		Non native		Digital native	
	N	%	n	%	n	%
Legacy national	26	6.6	21	7.0	5	5.6
Legacy regional	79	20.2	76	25.2	3	3.3
New groups	19	4.8	3	1.0	16	17.8
Magazines	42	10.7	41	13.6	1	1.1
Other	226	57.7	161	53.3	65	72.2
Total	458	100	355	100	103	100

A publishing group could not be determined for 66 cases

Overall, 72.2% of digital natives with paywalls or memberships are published by organisations, associations, or foundations not linked to the traditional Spanish news media groups, followed by the new publishing groups with national coverage (*Titania*, *El León del Español*, and *ElDiario.es*) (17.8%). On the other side, traditional groups, either the national or the regional/local ones, and the leading magazine groups, have a stronger position on non-digital media with some payment strategies (7%, 25.2%, and 13.6%, respectively).

7. Discussion

The Spanish digital news media market has a poor diversification of revenue portfolios, and it evolves very slowly towards the adoption of new sources of income (**Vara-Miguel** *et al.*, 2021; **Salaverría** *et al.*, 2019; **Tejedor**; **Pla-Pablos**, 2020; **Negreira-Rey**; **López-García**; **Vázquez-Herrero**, 2020). However, the decline of advertising expenditure explains why some organisations have been experimenting with new formulae to improve their financial health, and user payments per unit –by subscription or by membership– are now familiar strategies for 16% of Spanish digital news media (458 outlets) (**Vara-Miguel** *et al.*, 2021).

Previous research has also shown that traditional, national, and specialised online media in Spain have a broader and more innovative revenue mix than digital-native, regional, or local and general-interest news outlets (**Vara-Miguel** *et al.*, 2021). From this starting point, this paper has tried to perform further analysis of these variables, encompassing the type of media organisation based on its corporate ownership, to understand if digital-native media and non-native media approach potential user payment strategies in a similar way.

According to our results, payment strategies are currently more usual amongst non-native digital media. Furthermore, revenue streams of non-native digital media with payment strategies tend to be less diverse; for these non-digital media, user payment and advertising are the only sources of income. On the other hand, digital-native media with payment strategies have a much more diverse revenue portfolio –65.1% of them have a combination of three or more revenue streams against 56.7% of non-native media. Paywalls or memberships are more frequent among non-native outlets.

These media financing strategies with payment models, which are more conservative in the case of non-natives and more diversified in the case of natives, differ from the one observed by **Vara-Miguel** *et al.* (2021) in their analysis of all digital media, regardless of their funding model. The authors concluded that, in general, the revenue mix of Spanish digital-native media outlets, as a whole, was less diversified, with fewer income streams, than that of non-native media, and the portfolio of sources was also more conventional for digital natives, as it relied mostly on traditional advertising (**Vara-Miguel** *et al.*, 2021).

- First, this difference suggests a greater openness to innovation and experimentation with new sources of income by those digital natives who have taken the risk of implementing a payment model, as opposed to a more conservative strategy by those who are financed in other ways.
- Second, it suggests that those who venture to use the payment model have sufficient technological, human, and financial resources to experiment with various sources of income, as **Casero-Ripollés** and **Izquierdo-Castillo** (2013) concluded.

Also, our data shows that although paywalls and memberships are more usual amongst specialised outlets (52.6%) than in generalist media (47.4%), there are significant differences between natives and non-natives: most digital-natives implementing some pay-per-content strategy are generalist (56.3%) while non-natives doing so are specialised (55.2%). Results from digital natives partially contradict the idea highlighted by previous research that paywalls or memberships are a practical model only for media offering exclusive and differentiated niche products, that have high relevance for relatively small but motivated audiences (**Arrese**; **Kaufmann**, 2016; **Himma-Kadakas**; **Kõuts**, 2015). Paywalls and generalist outlets are not always at odds, as evidenced by the cases of *ElConfidencial.com*, *ElDiario.es*, or *El Español*, three of the most successful digital natives in Spain (**García-Avilés**, 2018; **Breiner**, 2022).

The analysis of the territorial coverage (national *vs* regional-local) shows that paywalls and memberships are more often implemented by local or regional digital media (54.6%) than by national ones (45.4%). However, the payment method

is more broadly established in non-native media with regional or local scope than in digital natives. This data shows the strength that regional and local media publishers such as *Vocento*, *Prensa Ibérica*, *La Voz de Galicia*, *Grupo Godó* or *Promecal* have in Spain. Thus, the data shows that 20.2% of media outlets with paywalls or memberships belong to these traditional regional groups, compared to 6.6% belonging to legacy national groups, confirming that local companies can take advantage of their smaller size and niche content that is not being covered adequately by the mainstream (**Negreira-Rey**; **López-García**; **Rodríguez-Vázquez**, 2018; 2020). Also, our data supports the idea that, when it is locally produced, local news can attract readers and subscribers (**Kim** *et al.*, 2021a).

In addition to this conclusion, and regarding the type of media group each digital outlet is owned by, the results confirm that most of the legacy groups, both regional and national, have chosen to innovate and develop new financial alternatives in the digital editions of their main offline brands, and they have not created many new digital-native brands with a reader payment strategy. Thus, of the 108 digital media brands belonging to legacy groups with payment systems, only eight are digital natives. This is quite the opposite of new media publishing groups, who are the main owners of the digital-native outlets, and mainly focus on national issues.

Finally, our study shows that the implementation of payment methods is not exclusive to large publishing groups, either newspapers or magazines. On the contrary, the analysis by type of company shows a very fragmented market in which 72.2% of digital natives with paywalls or memberships are published by organisations, associations, or foundations not linked to the traditional Spanish news publishing groups, and are neither national or regional. Most of them are highly focussed companies with low costs (**Medina-Laverón**; **Sánchez-Tabernero**; **Breiner**, 2021). They are usually niche outlets, whose production, distribution, and marketing costs have been dramatically reduced, and they are audience-oriented, trying to cover relevant issues unavailable anywhere else. With these advantages they try to compete with the big legacy groups and with the leading native firms.

Likewise, the data allows us to classify the market of paying for online news into three models. The first model, that of legacy media, is both regional and national, and these organisations benefit from their reputable brands and greater technological, human, and financial resources to seek new financial alternatives. The second model consists of well-established digital natives, who are characterised by organic growth models and by offering content that is impossible to imitate by their competitors. The third model is that of greatly focussed small companies with low costs, which try to survive by expanding their income portfolio to payments for accessing content, memberships, and other revenue streams not studied in this paper.

8. Conclusions and further research

The map of payment for news content in Spain is not uniform, confirming the idea that there are no universal formulae to achieve sustainability. In part, the differences are conditioned by the nature of the digital media outlets, native or non-native, but also by the type of media group to which each outlet belongs. This article contributes an exhaustive analysis of the state of user payment for digital news, specifically of the common characteristics, but also of the differences between digital natives and non-natives that offer paywalls or membership plans. The former are more likely to cover general issues than specialised topics, contradicting previous studies, and their scope is more frequently national rather than regional. In contrast, non-native media tend to offer coverage focussed on specialised and local or regional issues.

Finally, we must acknowledge some limitations that arise from the method of data collection. As we stated in the Methodology section, all the data and conclusions of this research were based on publicly available information, and we could not consider any revenue stream that was not visible or declared by the news outlet on their website.

Second, we have clustered in a single group of analysis those digital media with subscription models and those with membership models, although there are crucial differences between the two types. While the nature of the subscription implies an exchange between the media organisation and the reader, membership is a more relational concept, as donors or members pay without expecting any return, just in order to financially support a news organisation because of its ideology or mission. Both types of payment are essentially different, but this research has not taken this into account.

Finally, this paper has only focussed on the type of revenue, but not on the total revenue that each digital media outlet earns, and their contribution to the total profits (or losses) or the companies in comparison with other possible funding sources. Taking a closer look at the financial records of the media firms will help to answer the crucial question about the contribution of readers to the sustainability of the news organisations.

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Performance of journalistic professional roles in digital native media news in Spain: Toward a journalistic micro-culture of its own

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Abstract

On the basis of the argument that media platforms generate journalistic micro-cultures and that the nature of journalistic roles is contextual, the possible existence of a journalistic model of digital native media coherent with its own professional culture is addressed. Through a content analysis of a sample of 2,729 news items published in four Spanish digital native media, the presence of six professional roles (interventionist, watchdog, loyal-facilitator, service, infotainment, and civic) is measured and compared with the implementation of these roles in news items published in press, radio, and television (*N* = 3,362). In addition, the factors that influence the presence of each role in the news of the selected digital native media are analyzed. The results show that digital native media distinguish themselves by putting into practice all the journalistic roles, except for the civic one, to a greater extent than other platforms. Likewise, the service role presents similar levels of presence in the four newspapers analyzed, indicating an approach to audiences more as customers than as citizens. In terms of the factors associated with the presence of each role, we found that the subject matter of the news item has a greater predictive capacity in all roles than other elements. Although we cannot confirm the existence of a journalistic micro-culture, we do find some particularities of the digital native media, mainly stemming from the need to build audience loyalty.

Keywords

1. Introduction

From the beginning of the digital press in the mid-1990s to the present day, what was born as a modest and simplified replica of the printed newspaper in digital format ("the electronic newspaper"), and which lacked a strategic vision of the future, has been absolutely transformed, in terms of its business, organizational, and professional structure as well as in terms of news production, and obviously, its content and scope.

The chronology and stages of the evolution of digital media in Spain have been thoroughly analyzed gradually by different works, the most recent and exhaustive update of which can be found in the monograph by **Salaverría** and **Martínez-Costa** (2021). It is indeed the first of these authors (**Salaverría**, 2021) who established a chronological map of the evolution of cyberjournalism, distinguishing seven stages, from the "experimental" one of 1995 to the current one, defined as "robotization."

Despite the often-adverse structural conditions, the advance of digital journalism has been unstoppable, mainly owing to technology, which has acted as a real lever for transforming the media ecosystem. Technological tools have allowed for a spectacular improvement in the management, structural organization, presentation, and publication of content, especially since the implementation of content management systems (CMS). The compatibility between different programs also resulted in the formal enrichment of content, especially graphic and audiovisual content, as well as in the articulated integration of languages and formats, which made it possible to create new multimedia and interactive narrative plots, unique to digital publications and a motivating factor for their use. In addition, it is important to highlight the massive implementation and extension of the so-called social web, whereby the online media extend to the collaborative participation of the audience. These new formats demanded, in turn, new production routines. Finally, the aggregation of all these components, together with another determining factor, the permanent updating of content, gave rise to what one might call a web information model or style, which within the limitations and capabilities of each medium or channel, has been implemented and has permeated the rest of the media. In the words of **Martínez-Acosta**

> "emerging digital media have in many cases led both productive and narrative innovation processes, which have contributed to improving the quality of content" (2019, p. 77).

Digital native media are a consequence of this development. **Nicholls** *et al*. (2018) establish two phases: a first one in the 1990s with the emergence of portals such as *MSN* or *Google News*, and a second wave from 2005 onward with media producing their own content instead of relying mainly on collection and electronic copy. It is indeed during the last great economic crisis when digital native media begin their great growth (**Negredo** *et al*., 2020a). These new media differ from traditional brands in terms of their business models, distribution strategies, corporate organization, and editorial priorities (**Vara**, 2020).

However, the literature on how the structural characteristics of a medium determine a logic of content production moves between two perspectives: the generalist and the particularist (**Reich**, 2011). For those who hold with the generalist view, journalists in all media produce their news in much the same way. However, according to the particularist perspective, reporters on each platform employ particular practices according to the "logic of the medium." This distinction is directly related to what has been called the affordances of media platforms (**Mellado** *et al.*, 2021). Within this particularist perspective, in this paper we propose that there may be a micro-culture (**Ericson**; **Baranek**; **Chan**, 1989) specific to digital native journalistic media (see, for example, **Mellado**; **Scherman**, 2021), with the understanding that a journalistic model may be fragmented into different micro-cultures that represent a certain degree of heterogeneity. **Martínez-Nicolás** has pointed out several differentiating factors of journalistic cultures:

> "the ownership of the companies (public or commercial media), the scope of dissemination (state, regional, transnational), the editorial orientation (quality press, sensationalist press), the type of media (press, radio, television), the mode of dissemination (conventional, on line)" (2015, p. 158).

Thus, digital native media generate their own features within the journalistic culture in which they are inserted and with which they share distinctive features.

Furthermore, in research on professional roles, few studies have addressed the similarities and differences, both between journalists working on different platforms (evaluative level of roles) and the roles present in different types of media (performative level), and those that have been carried out reveal contradictory results that do not allow for the balance to be tipped in favor of either of the two perspectives.

On the basis of the argument that media platforms generate journalistic micro-cultures and that the nature of professional roles is situational, historical, and therefore contextual (**Mellado**, 2020), we address herein the possible existence of a journalistic model of digital native newspapers coherent with their own professional micro-culture, analyzing the implementation of six professional roles in

> Digital native newspapers in Spain present certain particularities in the materialization of professional roles with respect to the rest of the media on other platforms

the news content of digital native media and its comparison with three other platforms (press, radio, and television). Through a content analysis of a sample of 2,729 news items published in four Spanish digital native media, the presence of six professional roles (interventionist, watchdog, loyal-facilitator, service, infotainment, and civic) is measured and compared with the implementation of these roles in news items published in press, radio, and television (*N* = 3,362). In addition, we analyze which factors –thematic beat, news sources, media size, political orientation– are associated with the presence of each role in the digital native media. The study is part of the *Journalism Models in the Multiplatform Context* research project (CSO2017-82816-P), which is encompassed in the international *Journalistic Role Performance project*: *https://www.journalisticperformance.org*

2. Digitalization and journalistic routines

The media and communications industry, and consequently the journalistic profession, have undergone a profound transformation since the beginning of the twenty-first century. **Albarran** (2010) highlights technology as possibly the most dramatic of the macro forces –globalization, economics, regulation, social change, technology– that converge interdependently in this process and are a catalyst for change.

Digital media emerge in this ecosystem, understood as

> "products and services that come from the media, entertainment and information industry and its subsectors" (*WEF*, 2016, p. 5),

where products of previously consolidated journalistic brands from outside the online environment (legacy digital publications) coexist with new publications, labeled in the literature as digital-born, digital-native, online-native, pure players, or start-ups (**Salaverría**, 2020). The latter, immersed in digital culture, which is collaborative, data-driven, customer-centric, and innovative (*WEF*, 2021), disrupted the media industry, altering everything from business models and forms of production and distribution to consumption habits in a path paved by the struggles of traditional platforms in their search for a place in this new environment (**Harlow**, 2018, p. 543-544). Traditional media have been forced

> "to search for new journalistic strategies, formats, and narratives similar to those being developed by the new media" (**Rojas-Torrijos**; **Caro-González**; **González-Alba**, 2020, p. 160).

Nevertheless, **Majó-Vázquez** *et al*. (2020) found that traditional media are considered to be the most authoritative sources and retain much of the control over audience flow, and although young audiences confer intermediary power to digital native media, they are still far from displacing traditional branded media.

At the same time, digitalization and the emergence of digital media, as well as their increasingly strong role as gatekeepers and content providers of intermediaries (via social media, search engines, and news aggregators) (**Magin**; **Stark**, 2020) transform the journalistic profession and journalism, to which a subfield is added with the digital label. This change in the professional profile and ways of working is indisputable, to the point of updating the training of future journalists with renewed curricula with competencies

> "that have incorporated not only the technological transformation, but also the socioeconomic changes of the societies of the third decade of the millennium" (**López-García**, 2021, p. 2).

Among the new tools and practices in journalism, **Van-der-Haak**, **Parks** and **Castells** (2012) highlight networked journalism, which now involves the product of journalistic practice to networks of various professionals and citizens, although the practices of meaning construction are generally not distributed. Likewise, digitalization does not put an end to the intermediation function of journalism, despite the fact that it is based on new inclusive capabilities (**Sorrentino**, 2016).

Journalism has had to rethink its relationship with the public as key to its sustainability (**Lawrence** *et al.*, 2019). Interactivity changed the relationship between the individual and the media, shifting the emphasis from persuasion to relationship building (**Chan-Olmsted**, 2006). Today, web analytics makes it difficult for journalists to ignore feedback from their audiences (**Tandoc**, 2019), and among their skills are understanding metrics and audiences (**Anderson**; **Bell**; **Shirky**, 2012).

On the contrary, the media must adapt to the logics of social media to remain visible to the audience, and a strategy for this may be the intensification of the use of news banalization (**Magin**; **Stark**, 2020), a term under which the concepts of eroding of boundaries, tabloidization, infotainment, hard and soft news, and sensationalism are placed in hierarchical order (**Otto**; **Glogger**; **Boukes**, 2017). However,

> "the supply of public interest journalism that serves the needs of citizens in a democratic society has always been scarce in the media marketplace when compared with sensationalism, gossip, entertainment, propaganda, and misinformation" (**Medina-Laverón**; **Sánchez-Tabernero**; **Breiner**, 2021, p. 1).

Some studies reveal that the use of audience metrics has a negative impact on news quality (**Fürst**, 2020; **Palau-Sampio**, 2015), and indeed the definition of quality applied to the journalistic product –determined by criteria such as relevance, neutrality, or impartiality, not depending on consumer preferences– differs from that used in the economic sphere, presented as the capacity to satisfy consumer needs (**Wellbrock**, 2016). At the same time, journalists face the complicated combination of quality with the speed imposed by new media, and there is a feeling among professionals that combining the two is an arduous task (**Ramírez-de-la-Piscina** *et al.*, 2015).

Perreault and **Ferrucci** (2020) argue that digital journalistic practices are no longer an element of individual adoption, but rather have become organizationally embedded within the field, and that digital journalists reflect on their own *doxa*, for example, addressing traditional journalistic concerns such as the watchdog function of the media and journalistic autonomy. In addition, the journalists who these authors interviewed describe their work as audience oriented to a greater extent than in traditional media.

This leads us to consider the existence of a change in the concept of journalism. At the end of the first decade of online journalism, **Deuze** (2003) proposed to identify the effect of the online practice of journalism on the profession and its culture. Identifying four types of online journalism and analyzing them in terms of key characteristics of online publishing –hypertextuality, interactivity, and multimediality– he argues not only that the practice of online journalism has consequences for the type of journalism produced on the web but also that its characteristics and online journalism, in fact,

> "connect to broader and more profound changes and redefinitions of professional journalism and its (news) culture as a whole" (**Deuze**, 2003, p. 203).

In the same vein, **Waisbord** (2019) states that digital journalism presents opportunities and threats for traditional journalism, forcing the latter to reevaluate their connections with social actors, adapt to new circumstances, and revalidate their identity when news is everywhere.

Carlson and **Usher**'s examination of the manifestos –as meta-journalistic discourses– of several digital news startups reveals how these, in their view,

> "do not disrupt underlying and long-held journalism ideals and traditional aspirations" (2016, p. 576).

Other studies show the coexistence of traditional and new principles in digital native media (**García-Orosa**; **López-García**; **Vázquez-Herrero**, 2020). **López-del-Ramo** and **Olivera-Zaldua** (2013) did not identify differences between the production and treatment of content in their study of 20 native and migrated digital media, above all in the numerical contrast in staff and the possible use of synergies between different media of the same group, from which migrated newspapers can benefit with respect to native newspapers.

Benson *et al.* (2012) conclude that, in general, online news across media systems (although somewhat less consistently in Denmark, the country studied as representative of the corporate media system) tends to be lighter and somewhat more sensationalist, feature more advertising, and be more open to deliberation, opinion, and non-journalistic voices. Meanwhile, **Brown** *et al.* (2016) identify that news topics considered to be hard news in online publications received sensationalist treatment with the same frequency as traditionally sensationalist categories.

3. Professional roles and news content

Research on professional roles in recent years has shifted its interest from the evaluative level of professional roles to the performative level (journalistic practice reflected in news content), taking into account that the news not only reflects the perceived functions or roles of journalists (the roles at the evaluative level), but also the influences that stem from decisions made within the newsroom and from negotiations with different reference groups (**Mellado**, 2015).

In this paper, we start from **Mellado**'s (2015; 2020) conceptualization of the performance of professional roles manifested along 6 independent dimensions generated from three domains:

- the presence of the journalist's voice in the news;
- the relationship of journalism with those in power; and
- the way in which the audience is approached (**Donsbach**, 2012; **Eide**; **Knight**, 1999; **Hanitzsch**, 2007).

The first domain analyzes the passive versus active posture of journalists as actors in the news. A passive attitude is based on neutrality and distance between the journalist and the facts, while in the interventionist pole, that is, the more active attitude, professionals have a voice in the news, even supporting certain ideologies and/or certain social groups.

The second domain refers to two journalistic roles through which journalists and the media establish their relationship with the elites in a society:

- the watchdog role seeks to monitor those in power, calling attention to possible abuses and irregularities. This journalistic dimension is evident when the news includes questioning, criticism, or accusations against those in power, including investigative reporting or coverage of external investigations and showing the conflict between the media and the powerful;
- the loyal-facilitator role materializes in two ways, either by cooperating with those in power to protect the status quo, or by fostering a sense of belonging to one's own country and strengthening national prestige and patriotism.

Finally, three roles are differentiated on the basis of different understandings of the audience –as citizens, spectators, or clients:

- service journalism approaches the public as a clients, providing information, knowledge, and advice about goods and services that the audience can apply in their daily lives;
- infotainment journalism addresses the audience as a spectator;
- whereas the civic role is based on offering the audience information and training regarding demands, rights, and duties and other issues related to the exercise of citizenship and their participation in social, political, and cultural life (**Mellado**; **Van-Dalen**, 2017).

These roles are not mutually exclusive and can be present in the same news item, with the ability to be combined to generate intermediate roles (**Mellado**, 2020). For example, given the interdisciplinary nature of the interventionist role in journalistic practice, one may expect a correlation with and the generation of changes in other journalistic roles (**Mellado**, 2020). **Humanes**, **Alcolea-Díaz** and **González-Lozano** (2021) found the combination of the interventionist role with the watchdog, civic, and infotainment roles in their study of the television channels *La sexta* and *Antena 3*.

Role co-occurrence can also exist between professional functions from different domains (**Mellado**, 2020). In terms of the domain of power relations, the watchdog and loyalist-facilitator roles can coexist. For example, in media systems characterized by political parallelism, watchdog orientation might correlate positively with elite support orientation if a news story criticizes or denounces the wrongdoing of some actors while supporting other political elites.

> The presence of the service role characterizes all the digital native newspapers analyzed, and they also put into practice all the other journalistic roles, except for the civic role, to a greater extent than the press, radio, and television

Such co-occurrences of different roles may also arise within the audience relationship domain. The first is the coexistence of civic, information, and entertainment roles, mixing elements of public life and features of citizenship and entertainment. The second involves the civic and service roles, while a third match may occur between the service and infotainment roles.

Finally, it is also possible to address specific combinations of roles between the domains of power relations and audience approach. The first involves the civic and watchdog roles, producing a news performance that evokes an audience that is critical of those in power. A second combination occurs between the infotainment and watchdog roles, with news that includes the joint presence of surveillance and scandal, emotionalization, or the private lives of those in power. In the above-cited study, these combinations were found in the news programs of *La sexta* (**Humanes**; **Alcolea-Díaz**; **González-lez-Lozano**, 2021).

Finally, studies on the performance of professional roles have sought to go beyond mere description and typologies, seeking explanatory variables of a different nature and level of analysis. In this work, we have selected predictors grouped in three blocks.

News topics have been shown to be important predictors of role materialization in different contexts and media (**Mellado**; **Lagos**, 2014; **Hellmueller** *et al.*, 2016; **Mellado** *et al.*, 2017; **Wang** *et al*., 2017; **Humanes**; **Roses**, 2018; **Mellado** *et al.*, 2017; **Márquez-Ramírez** *et al.*, 2020; **Mellado** *et al.*, 2021). Thus, the watchdog role is more present in news related to crime and courts, the civic role is mainly put into practice in the coverage of protests or human rights, and the service role is primarily associated with health or education news.

News sources are also one of the external influencing factors that can determine the materialization of roles in news content, since as indicated above, journalistic performance is expressed both in the decisions made in the newsroom and in interactions with reference groups. The selection of news sources is related to the materialization of certain roles, so that the watchdog role, the loyal-facilitator role, or the civic role are each found to have a greater presence depending on the sources used in news production (**Hellmueller**; **Mellado**, 2016). For example, **Tandoc** *et al* (2020) found that the number of sources was positively associated with the six roles analyzed herein.

At the organizational level, characteristics such as the type of media, the size of the organization, and the nature of its ownership have also been identified as predictors of role performance (**Mellado**; **Lagos**, 2014; **Hellmueller** *et al.*, 2016; **Mellado** *et al.*, 2017; **Wang** *et al*., 2017; **Humanes**; **Roses**, 2018; **Mothes**; **Schielicke**; **Raemy**, 2020). In general, the infotainment role is more present in popular newspapers, while the watchdog role is practiced to a lesser extent in the public media. In terms of ideology, the more progressive media tend to implement the watchdog and civic roles to a greater extent.

4. Professional roles in digital journalism

Traditionally, research on professional roles has focused on the study of a single media platform, whereas works comparing similarities and differences between different information platforms –press, television, radio, and internet– are scarcer (**Mellado**; **Vos**, 2017) and have produced inconclusive results.

Thus, **Cassidy** (2005) identified no differences between online journalists and their print colleagues. **Quandt** *et al.* (2006) found that the two most important roles for American and German journalists were those related to neutral journalism and interpreter. **Willnat**, **Weaver** and **Wilhoit** found that, in the United States, journalists working in any type of media, including online, tend to value the interpretive role of journalism more than citizens, while citizens value the disseminating role more (2017, p. 433). **Fahy** and **Nisbet** (2011), with respect to science journalists in online media in the English-speaking sphere, stated that the traditional role of disseminator of scientific advances had been replaced by a more interactive journalistic model with the public. **Schmitz-Weiss**, in a study on digital journalists in Latin America, found that the populist mobilizing model was the most present, relating this model above all to the roles of

> "giving people a chance to express their views on public affairs, and pointing people to possible solutions to today's problems in comparison to the other countries" (2015, p. 90).

Agarwal and **Barthel** (2015) found in their study that digital journalists were strongly committed to the role of power adversary, rejecting the roles of populist disseminator and mobilizer, which for those authors further emphasizes the idea that norms for online journalists are being formed in new media. **Ferrucci** and **Vos** (2017), in their study based on in-depth interviews, found differences between the roles considered to be most important for digital journalists versus traditional journalists. Digital journalists report the disseminator role as being unimportant, arguing that they should focus on context and analysis in connection with the needs of the audience. However, they did not consider the watchdog role central, contrary to the above-mentioned study by **Agarwal** and **Barthel** (2015). **Henkel** *et al.* (2020), in turn, found more similarities than differences between online and traditional journalists, as both broadly share the same professional ideology centered on the notion of objectivity, and online journalists, particularly those working for digital native media, show significantly less interest in the critical "watchdog" role than their traditional colleagues.

The findings of **Mellado** *et al.* (2021) referring to the Chilean media system suggested that differences in news content were a complex phenomenon that could not be attributed solely to technological characteristics, but rather to the nature of news production, where news-gathering routines and organizational factors play an important role. However, some differences were found in the implementation of professional roles, since while traditional print media presented a greater presence of loyal, civic, service, and infotainment roles, digital media were associated with a greater presence of disseminator and watchdog roles (**Mellado** *et al.*, 2021).

In the Spanish case, the presence of professional roles in the news published in digital native media has not been addressed.

On the basis of this literature review, the following formal research questions are posed:

> RQ1: Are there significant differences in the presence of interventionist, watchdog, loyal-facilitator, civic, service, and infotainment journalistic roles between digital native media and other platforms (print, radio, and television)?

> RQ2: Which intermediate roles are most present in digital native media?

> RQ3: What individual and organizational factors –topics, news sources– or organizational characteristics –media size, political orientation, specific media– best explain the differences in the presence of journalistic roles in digital native media?

5. Methodology

A content analysis of news stories (*N* = 2,729) published in four digital native media (*El confidencial*, *okdiario*, *eldiario.es*, and *HuffPost Spain*) during 2020 was conducted (Table 1). These four media were selected because of their audience penetration, for which we utilized *Digital News Report Spain 2020* (**Negredo-Bruna** *et al.*, 2020b) as a source. In addition, these media represent different editorial lines (Table 1) in which each medium has been identified with the majority ideology of its audience according to the *Post-electoral Study General Elections 2109* of the *CIS* (2019). To make the comparison with traditional media, a sample of 3,362 news items in eight media (*Antena 3*, *La sexta*, *La 1*, *SER*, *Onda cero*, *El país*, *La vanguardia*, and *El mundo*) was used, which were analyzed following the same protocol and methodology as that applied to analyze the news of the digital native media to guarantee the comparative analysis (Table 2, Annex 2).

Table 1. Characteristics of the sample of content analyzed

Media	No. of news items analyzed (%)	Launch year	Owner	Editorial line	Weekly audience
El confidencial	743 (12.2)	2001	*Titania Compañía Editorial, S.L.*	Center-right	6/14
Okdiario	838 (13.8)	2015	*Dos Mil Palabras, S.L.*	Right	6/12
Eldiario.es	511 (8.4)	2012	*Diario de Prensa Digital S.L.*	Left	7/17
HuffPost Spain	637 (10.5)	2012	*Prisa Noticias*	Center-left	3/7

Sample

To avoid biases derived from daily and monthly variations, the sample was selected by dividing the year into two 6-month periods: January–June and July–December. For each 6-month period, a constructed week was created by randomly selecting start dates on a Monday in January and a Monday in July. Using intervals of 3–4 weeks, the sample was drawn from the following days: a Tuesday, a Wednesday, a Thursday, a Friday, a Saturday, and a Sunday. This procedure made it possible to include 7 days in each period for a total sample of 14 days during the year (Annex 1). Thus, the analysis of each of the 7 days of the week was guaranteed for each period, and each month of the year was represented by at least 1 day, avoiding the overrepresentation of any period.

In a second step, the home pages of the websites were "captured" at two fixed points during the sampled days: one at 11:00 a.m. and one at 11:00 p.m., so that the greatest amount of content variability was collected. The home pages and their respective links were opened in real time and saved.

Finally, the unit of analysis was each news item, defined as the set of verbal, and where appropriate, sound and/or visual elements referring to the same event/subject/person. All news published on the following previously defined topics was analyzed: government, politics and electoral campaigns, economy and business, police and crime, courts, defense/national security, education, health, environment, energy, transportation, housing, accidents and natural disasters, religion and churches, labor and employment, demonstrations and protests, social problems, media, sports, science and technology, lifestyle, culture and entertainment, celebrities, and other. The topics were defined in the analysis protocol prior to coding, generating 3 variables with 24 categories, so that for each news item the presence of up to 3 themes was measured. These were then recoded, transforming each theme into a dichotomous variable (presence/absence). Editorials and opinion pieces, as well as weather news, horoscopes, supplements, sponsored content, billboards, and hobbies, were not included in the content analysis.

Measurements and coding

To carry out the coding, we followed the operationalization proposed by **Mellado** (2015) to measure the presence of professional roles in the news, which has been validated in subsequent studies (**Mellado** *et al.*, 2017; **Mellado** *et al.*, 2021; **Humanes**; **Roses**, 2018; **Humanes**; **Alcolea-Díaz**; **González-Lozano**, 2021).

The coding manual included the operational definitions of interventionist, watchdog, loyal-facilitator, service, infotainment, and civic role performance. Five indicators were used to measure the presence of the interventionist role, nine for the watchdog role, eight for the loyal-facilitator role, five for the service role, five for the infotainment role, and nine for the civic role (Table 2). Each indicator was measured on the basis of presence (1) or absence (0). In the case of some indicators, we also coded for the actor or action toward which the journalist's or source's comment was directed. We transformed these indicators into dichotomous variables to calculate the main roles and place all our measures on the same scale. Additionally, we assume on the basis of the theoretical foundation of the literature on role performance (**Lynch**, 2007; **Me-**

Table 2. Indicators for each role and level of intercoder reliability

Professional roles	Indicator
Interventionist (Ka 0.78)	Journalist's point of view/opinion
	Interpretation
	Call to action
	Use of qualifying adjectives
	Use of the first person
Watchdog (Ka 0.79)	Information on lawsuits or administrative proceedings
	Journalist questioning
	Third-party questioning
	Journalist criticism
	Third-party criticism
	Journalist discovery
	Third-party discovery
	Report based on external research
	Investigative report
Loyal-facilitator (Ka 0.87)	Advocacy/support of activities
	Policy advocacy/support
	Positive image of the elites
	National progress/successes
	Comparison with other countries
	National triumphs
	Country promotion
	Patriotism
Service (Ka = 0.85)	Impact on daily life
	Suggestions and advice (complaints)
	Suggestions and advice (individual risks)
	Information for consumers
	Tips for consumers
Infotainment (Ka 0.78)	Personalization
	Private life
	Sensationalism
	Emotions
	Morbidity
Civic (Ka 0.75)	Citizen reactions
	Citizen demands
	Citizen credibility
	Education on rights and obligations
	Local impact
	Impact on social communities
	Citizen reactions
	Information on citizens' activities
	Support to social movements

llado; **Hellmueller**; **Donsbach**, 2017) that journalistic roles could coexist. Therefore, the measures were treated as not mutually exclusive.

The coding was performed by four coders who were previously trained. Pretest reliability analyses were performed, and the coding process was monitored to improve intercoder agreement. Finally, a post-test was performed to determine the reliability of the coders in the actual coding process. Using Krippendorff's alpha (Ka), the final overall intercoder reliability was 0.80 (Table 2 includes the Ka value for each role).

After performing confirmatory factor analysis (CFA), the individual indicators making up each dimension were combined to generate a final role score. For descriptive purposes, raw scores (total points divided by the total items for each role) were calculated. The individual indicators that make up each role were thus combined on a continuous scale from 0 to 1, where a higher score expresses a greater presence of each journalistic role in the news, and vice versa. Factor scores were used to test for differences in the performance of the analyzed roles.

The content analysis also included variables related to (1) general information about each news item, such as date of publication, type, and location of the news item; (2) characteristics of the news item, such as topic and geographic frame; and (3) sources cited, including number of sources, type of source, diversity of type of sources, and diversity of viewpoints (Annex 2).

6. Results

Presence of professional and intermediate roles among digital natives

First, we measured the presence of the six journalistic roles in the four platforms that were part of the analysis to identify whether digital native media present differences with respect to the other three types of media (press, radio, and television). Analysis of variance (Anova) revealed statistically significant differences in all roles ($F_{Interventionist} = 145.421$; $p < 0.000$; $F_{Watchdog} = 48.571$; 45, $p < 0.000$; $F_{Loyal-facilitator} = 22.665$; 45, $p < 0.000$; $F_{Service} = 66.285$; 45, $p < 0.000$; $F_{Infotainment} = 10.232$; 45, $p < 0.000$; $F_{Civic} = 17.775$; 45, $p < 0.000$), although the strongest effect was identified in the interventionist role ($\eta2 = 0.067$), with the effects being moderate for the service ($\eta2 = 0.032$) and watchdog ($\eta2 = 0.023$) roles and very low for the infotainment ($\eta2 = 0.005$) and civic ($\eta2 = 0.009$) roles.

Specifically, digital native media put all these roles into practice to a greater extent than other media, except the civic role. However, it is in the presence of journalistic voice (M = 0.25; SD = 0.219) in the service role (M = 0.09; SD = 0.171) and in the watchdog role (M = 0.11; SD = 0.187) where the differences are greatest (Figure 1). Regarding the interventionist role, these results contrast with those found in Chilean online media, which are characterized by a more dissemination orientation, while in both contexts digital media are distinguished from traditional media by being more watchdog of power (**Mellado** *et al*., 2021).

When we analyzed the existence of differences in the presence of roles among the selected digital native newspapers (Figure 2), they were only found in the interventionist (F = 24.236; $p < 0.000$; $\eta^2 = 0.026$), watchdog (F = 14.842; $p < 0.000$; $\eta^2 = 0.016$), infotainment (F = 11.268; $p < 0.000$; $\eta^2 = 0.012$), and civic (F= 20.952; $p < 0.000$; $\eta^2 = 0.023$) roles, although the effect is only weak or moderate. In the loyal-facilitator and service roles, there are no statistically significant differences.

	Intervencionist	Watchdog	Loyal	Service	Infotainment	Civic
Print	0.21	0.10	0.01	0.03	0.09	0.04
Television	0.11	0.05	0.01	0.05	0.10	0.03
Radio	0.15	0.09	0.01	0.02	0.09	0.07
Digitals	0.25	0.11	0.02	0.09	0.12	0.05
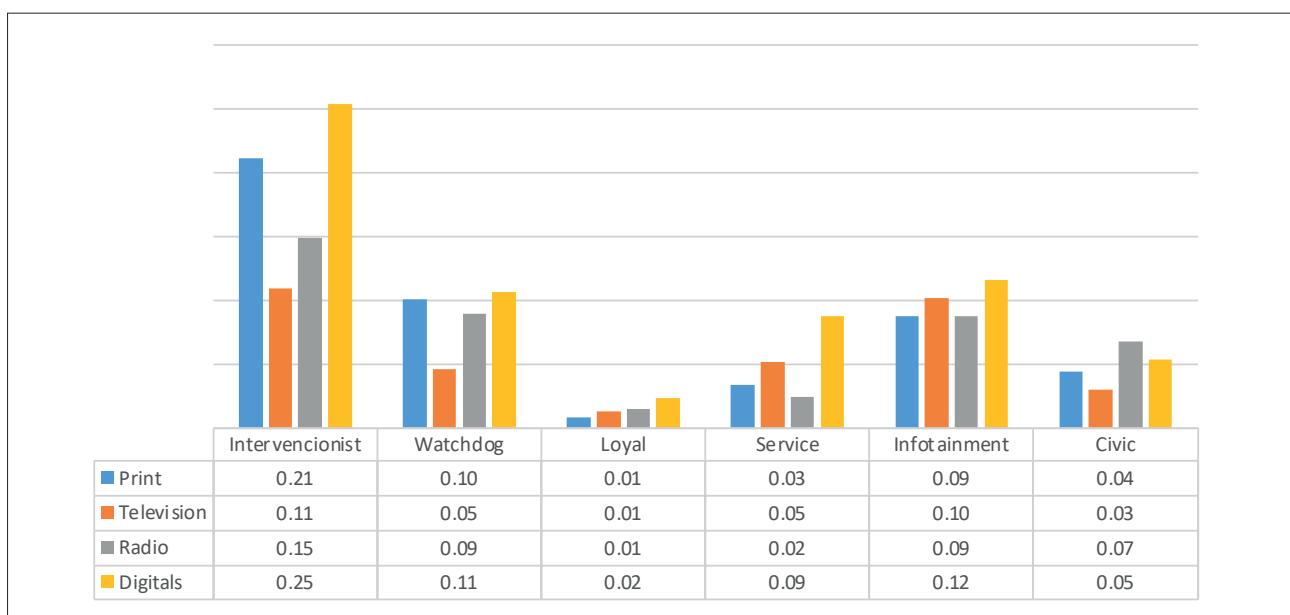
Figure 1. Presence of roles in the press, radio, television, and digital media

	Intervencionist	Watchdog	Loyal	Service	Infotainment	Civic
El confidencial	0.28	0.11	0.02	0.10	0.12	0.04
Okdiario	0.23	0.10	0.02	0.09	0.09	0.04
eldiario.es	0.30	0.14	0.03	0.10	0.12	0.09
Huffpost	0.21	0.08	0.02	0.07	0.15	0.05
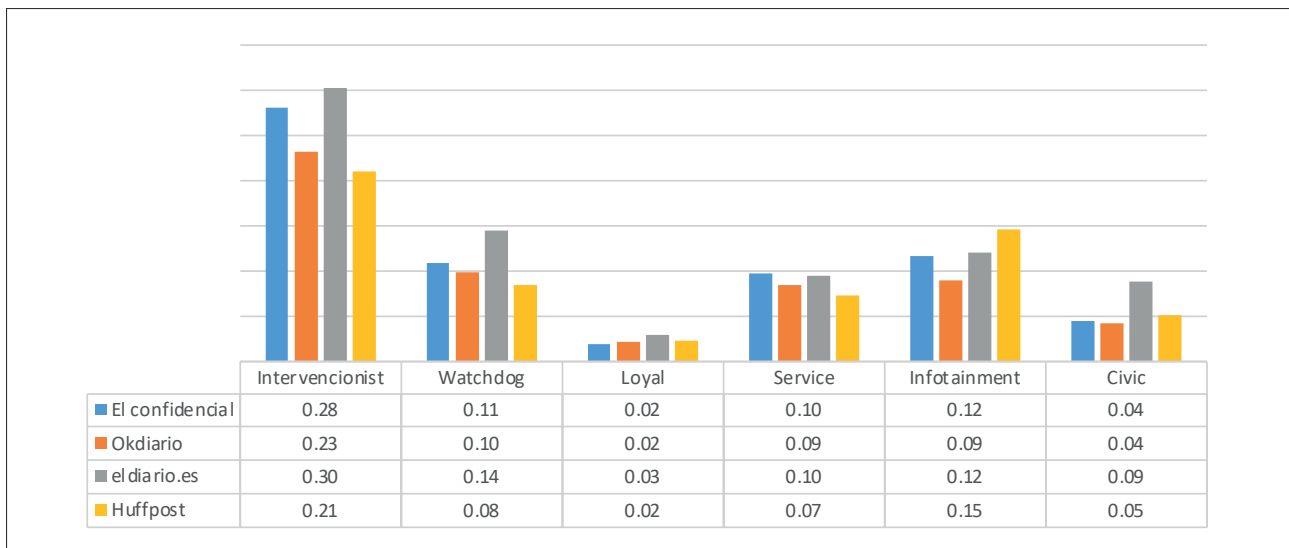
Figure 2. Presence of journalistic roles in digital native media news

The most interventionist digital native media are *El confidencial* (M = 0.283; SD = 0.223) and *eldiario.es* (M = 0.301; SD = 0.226), which also reach the highest values in the watchdog role ($M_{Elconfidencial}$ = 0.108; SD = 0.166; $M_{eldiario.es}$ = 0.144; SD = 0.183). *HuffPost* is highlighted as the newspaper that includes more infotainment elements in its news (M = 0.146; SD = 0.115), while *eldiario*.es caters more to the civic role (M = 0.088; SD = 0.151).

As proposed in RQ2, correlation analysis revealed the existence of several intermediate roles resulting from the co-occurrence of pure roles. Controlling for the specific publication, three intermediate roles were found (with correlation coefficients above 0.200).

The strongest combination is represented by the interventionist and infotainment roles (r = 0.274; p < 0.000), followed by the co-occurrence of the interventionist and watchdog roles (r = 0.227; p < 0.000). In both, the presence of journalistic voice is greater than that of the other roles. The third combination is that of the watchdog and civic roles (r = 0.224; p < 0.000), in which the watchdog role predominates. These last two combinations of the watchdog role with the interventionist and civic roles coincide with those found in the study of the *Atresmedia* group's channels in Spain (**Humanes**; **Alcolea-Díaz**; **González-Lozano**, 2021).

Explanatory models of professional roles in digital native media

Finally, we address which variables best explain the implementation of each of the six professional roles in the digital native media analyzed. For this purpose, multiple linear regressions were performed for each role, generating six models, all of which were statistically significant (p < 0.001). The stepwise method was used to introduce the predictor variables, grouped into three blocks (Table 3). The first is related to the subject matter of the news item and is made up of 22 variables (where each category of the original subject variable has been converted into a dichotomous indicator to be introduced into the regression analysis), to which an indicator has been added to measure the relationship of the subject matter with Covid-19. The second block of variables is related to information sources: number of sources, diversity of sources, diversity of points of view, use of expert sources, and use of witnesses. Organizational-level variables were the third block considered: size of the media, political orientation, and the specific newspaper (Annex 2).

The model for the interventionist role explains 15.9% of the variance, finding coefficients with predictive capacity in the three blocks of indicators considered. Thus, the topics most related to soft news (lifestyle, sports, entertainment and celebrities, and culture) are the ones with the greatest presence of journalistic voice, as well as other content such as health, politics, science, or environment, albeit to a lesser extent. The interventionist role is associated with the presence of a greater number of news sources and the use of experts, but not with a greater diversity of different types of sources. Finally, the presence of the voice of the media is more probable in *HuffPost* than in the rest, and more so in newspapers situated ideologically on the left.

The watchdog role explained 30% of the variance. In this case, the subject matter is the best predictor of this role, especially associated with political issues and news regarding crime and courts, as well as economic and labor information to a lesser extent. It is also a role associated with information related to Covid-19. Diversity of

> The most interventionist digital native newspapers are *El confidencial* and *eldiario.es*, which also attain the highest values for the watchdog role. *HuffPost* is highlighted as the newspaper that includes more infotainment elements in its news (M = 0.146; SD = 0.115), while *eldiario*.es caters more to the civic role (M = 0.088; SD = 0.151)

viewpoints is the predictor with the greatest explanatory capacity for the block related to sources. Organizational variables make no difference.

The model of the second role of the power relations domain (loyal-facilitator role) explains 6% of the variance. News regarding culture, politics, and the economy are the ones that show the greatest presence of the loyal-facilitator role. The rest of the predictors have less capacity, but the lack of diversity of viewpoints and the relationship with aspects related to Covid-19 are highlighted.

Table 3. Explanatory models of the materialization of professional roles

Predictors	Interventionist	Watchdog	Loyal-facili-tator	Service	Infotainment	Civic
Topic						
Campaigns/policy	0.051**	0.255***	0.101***	−0.054**	0.117***	0.047**
Police/crime		0.178***			0.107***	
Courts		0.150***				
Employment		0.068***		0.044**		0.121***
Economy		0.070***	0.117***	0.144***	−0.057**	
Defense		0.040*	0.050**			0.051***
Health	−0.190***				−0.087***	
Science/technology	0.067***		0.080***	0.169***		
Religion		0.048			0.061***	0.072***
Education				0.035*		0.057**
Social problems				0.036*	0.088***	0.180***
Protests		0.040*				0.173***
Environment	0.036*					0.073***
Energy				0.066***		
Transportation			0.076***	0.087***		
Housing				0.074***		0.062***
Accidents	−0.043*					
Lifestyle	0.159***	−0.040*		0.400***		
Culture	0.082***		0.133***	0.061***	0.094***	
Sports	0.112***		0.087***		0.149***	
Media		0.032*		0.068***	0.044*	
Entertainment/celebrities	0.102***		0.086***		0.326***	−0.041*
Covid-related news	0.045*	0.071***	0.089***	0.103***		0.112***
Information sources						
No. of sources	0.222***	0.075***				0.200***
Diversity of sources	−0.090**					0.162***
Diversity of points of view		0.236***	−0.097**			−0.103***
Use of expert sources	0.095***	0.082	0.080***	0.117***		−0.038*
Use of witnesses					0.080***	0.102***
Organizational characteristics						
Media size					−0.052**	
Political orientation	−0.066**		−0.051*			−0.047*
HuffPost	−0.143***					
Adjusted R²	0.159	0.300	0.061	0.274	0.204	0.250

The model for the service role explains 27.4% of the variance and is mainly associated with three themes: lifestyle, science and technology, and economy. In addition, it is one of the most amplified roles in relation to the Covid-19 pandemic and is also associated with the use of experts as a news source.

The model for the infotainment role explains 20.4% of the variance. Four topics have the greatest explanatory power: entertainment and celebrities, sports, politics, and crime. In relation to the other two blocks of variables, it is basically associated with the use of witnesses as a source and is more present in left-wing publications.

Finally, the model for the civic role explains 25% of the variance. Themes and indicators related to information sources are highlighted as predictors. Thus, news related to social problems, protests, and employment is addressed to a greater

extent by civic journalism. This role is also the one that is amplified to a greater extent in relation to Covid-19. All the variables in the information sources block explain the presence of this role, with the number of sources, their diversity and the lack of different points of view, and the use of witnesses being the most important.

7. Discussion and conclusions

The main objective of this study was to determine whether digital native newspapers in Spain have generated a micro-culture of their own, which is concretized in the implementation of professional roles in the news in a different way from the rest of the information platforms, in line with the particularist perspective.

The data revealed –responding to RQ1– statistically significant differences in the presence of the six roles among the four platforms. In addition, higher levels of explained variance (adjusted eta-squared) were found for the type of medium variable in all roles than for the specific medium (Table 4), except in the case of the press and for the infotainment and civic roles in digital native media. In other words, when comparing the presence of each role among the media on the same platform, the differences are smaller than when comparing the different presence of each role among platforms, with the exceptions mentioned previously. Thus, we cannot speak of a micro-culture as such, but we do find some particularities of digital native media.

Table 4. Explained variance between media and between platforms (adjusted eta-squared)

Roles	Press	Television	Radio	Digital native	Platforms
Interventionist	0.137	0.005	0.000	0.026	0.067
Watchdog	0.117	0.001	0.003	0.016	0.023
Loyal-facilitator	0.005	0.008	0.004	0.002	0.011
Service	0.120	0.003	0.004	0.003	0.032
Infotainment	0.130	0.006	0.001	0.012	0.005
Civic	0.005	0.040	0.007	0.023	0.009

Thus, it can be concluded in the first place that these media are distinguished by putting into practice all the journalistic roles –except for the civic role– to a greater extent than the media on the other platforms. However, it is the presence of the service role, which has similar levels of presence in the four newspapers analyzed, that characterizes these media. This indicates that one of the ways of attracting and retaining an audience in these publications is to focus on providing readers with useful information, in the sense of "news-you-can-use" from **Underwood** (2001, p. 100), which attempts to respond to individual needs, especially those related to consumer advice. As observed in the regression analysis, lifestyle news is the most associated with this role.

As mentioned above, one of the conditioning factors of digital media is audience metrics, and this study corroborates its reflection in the roles that digital native newspapers fulfill to a greater extent, understanding that their audiences are customers (service role) and viewers (infotainment role) especially.

On the contrary, the greatest differences between digital native newspapers are found in the interventionist, civic, and watchdog roles, which leads to the conclusion that even these roles are amplified by other variables and are not so strongly related to a journalistic model specific to digital native newspapers. Thus, more properly democratic roles (**Hallin**; **Mellado**, 2018) do not generate as much consensus as those that view the audience as a customer or spectator.

Intermediate roles (RQ2) have been identified in the digital native newspapers present in the four media: an adversarial guardian role (resulting from the concurrence of the interventionist and watchdog roles), a civic defender role (resulting from the concurrence of the watchdog and civic roles), and the role of entertainer–interpreter (resulting from the co-occurrence of the interventionist and infotainment roles). The presence of journalistic voice is part of the two strongest associations, which may reflect the central nature of the role in this type of publication.

Finally, we also wanted to analyze which factors best explain the presence of each of the roles in the digital native newspapers in the sample (RQ3). A first conclusion has to do with the explanatory capacity of the topics, which are the variables with the greatest predictive capacity in all the roles. This corroborates results from other studies that have highlighted the ability of news topics to explain the presence of professional roles (e.g., **Mellado et al.**, 2021). The second element that predicts the presence of roles is related to the handling of information sources, specifically to the number of sources and their diversity. Finally, it is also worth noting the limited importance of organizational characteristics, particularly the specific environment, which is only relevant in the interventionist role. This again reinforces the idea of role performance typical of digital native media.

> The performance of the roles of digital native media is also reflected in the factors that best explain the presence of each of the journalistic roles, highlighting as main explanatory variables the topics, followed by the management of information sources, while organizational characteristics are mostly of little importance

This work contributes to increasing knowledge regarding the roles of digital native media in Spain. Given the scarcity of studies focused on the materialization of journalistic roles in news content on these media platforms, we have obtained data for the first time that shed light on the journalistic model of digital native media, which while maintaining similarities to traditional media, also exhibits some unique features such as a greater presence of the service role and of journalistic voice. Therefore, in the case of the digital native media analyzed, the hypo-

> '
> The journalist's voice is part of the strongest intermediate roles identified in digital native newspapers (in those of adversarial watchdog and animator–interpreter), which could reflect the central nature of the interventionist role in this type of media
> '

thesis regarding the particularist perspective is not confirmed. Future studies should address as yet unanswered questions so as to address the need for a holistic understanding of journalistic roles that includes the point of view of digital native media audiences: what audiences ideally expect regarding the roles they should fulfill, or how they perceive what the roles fulfill in practice for media and journalists.

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Annexes

Annex 1. Specific sample collection days during 2020

Month	Day
January	Wednesday, 29
February	Thursday, 20
March	Friday, 20
April	Saturday, 11
May	Sunday, 10
June	Monday, 8
June	Tuesday, 30
July	Tuesday, 7
August	Wednesday, 5
August	Thursday, 27
September	Friday, 25
October	Saturday, 17
November	Sunday, 15
December	Monday, 14

Annex 2. Description of the variables of the analysis protocol included in the regression analyses

Topic	1 = government 2 = politics and electoral campaigns 3 = economy and business 4 = police and crime 5 = courts 6 = defense/national security 7 = education 8 = health 9 = environment 10 = energy 11 = transportation 12 = housing 13 = accidents and natural disasters 14 = religion and churches 15 = labor and employment 16 = demonstrations and protests 17 = social problems 18 = media 19 = sports 20 = science and technology 21 = lifestyle 22 = culture 23 = entertainment and celebrities 24 = other
Relationship with Covid-19	Dichotomous variable that mediates that of the news with aspects related to the Covid-19 pandemic
No. of sources	Total number of sources cited in a unit of analysis
Type of source	The presence of each source was coded dichotomously (presence/absence) for each item
Diversity of sources	0 = absence of sources 1 = one-sided coverage (all sources are of the same type, e.g., all are political sources) 2 = multiple types of sources
Diversity of points of view	0 = absence of viewpoints (no sources included) 1 = unilateral coverage (all sources agree on the same point of view or opinion) 2 = multiple points of view (different points of view are included)
Use of expert sources	Presence/absence of sources of information that are consulted as specialists in a specific area
Use of witnesses	Eyewitness statements are generally identified by direct or indirect quotations
Media size	1 = small (fewer than 50 journalists in the newsroom) 2 = medium (50–200 journalists in the newsroom) 3 = large (more than 200 journalists in the newsroom)
Political orientation	1 = left 2 = center-left 3 = center 4 = center-right 5 = right

Media entrepreneurship skills in Latin American universities social communication and journalism programs

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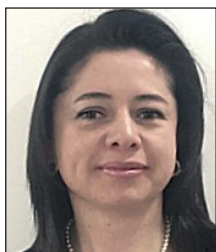
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Abstract

This study analyzes the social communication and journalism programs accredited by the *Latin American Council for Accreditation of Education in Journalism and Communication* (*CLAEP*) to identify the competencies and subjects whose expected learning outcomes contribute to general innovative professional profiles in media entrepreneurship. The study is a qualitative, descriptive study in which in-depth interviews were conducted with deans, program directors, and lecturers in communication, and syllabi and programs of the subjects that contribute to strengthening the components of entrepreneurship and innovation were analyzed. The main conclusions make it clear that entrepreneurial profiles should be strengthened since there are market opportunities for future communication and journalism professionals; there is no traceability in the projects developed in the different subjects in a way that allows for the strengthening of the entrepreneurial proposal; these reach an ideation and prototyping phase, which does not allow for the transfer of entrepreneurship to acceleration and growth units external to the program. Likewise, a proposal for the design of expected learning results is made for programs to use in their curricular designs to strengthen the profile and competencies in innovative entrepreneurship on the basis of eight categories: 1) identify the conditioning factors that determine entrepreneurship from its context, from the form they acquire to be recognized before the state and society as media and from the elements that configure their operational functioning; 2) understand the logics of the entrepreneurial ecosystem; 3) develop capacities in entrepreneurship; 4) manage media and journalistic projects; 5) design business models; 6) generate innovation processes, prototyping, and product testing; 7) obtain resources to accelerate entrepreneurship; and 8) establish growth and consolidation plans.

Keywords

Entrepreneurship; Media ventures; Competencies; Skills; Strengths; Weaknesses; Expected learning outcomes; Journalism; Business models; Higher education; Risks; Challenges; Latin America.

1. Introduction

Media are under constant situations of uncertainty arising from the risks and challenges inherent to the information industry, which point them toward redefining their social function, their business models, their production practices, their distribution channels, etc. (**Salaverría-Aliaga**; **Martínez-Acosta**, 2021; **Tejedor** *et al.*, 2020; **Cerezo**, 2019; **Picard**, 2014). Although risk and challenge are different concepts, they are interrelated when presenting entrepreneurship as an opportunity for work for future journalists in Latin America.

The main risk that communication professionals face is death. In the last decade, 937 journalists have been killed, one every four days (*Reporteros Sin Fronteras*, 2020). Latin America and the Caribbean are the world region in which the highest number of murders have been committed, with 40% of cases (*Unesco*, 2020). It is likely that people believe those murders have occurred during the coverage of armed conflict, yet *Reporteros Sin Fronteras* (2020) has provided evidence that 68% of murdered journalists were undertaking their work in countries at peace. Corruption, drug trafficking, inequality, environmental issues, etc. are the topics covered by emergent media (*Sembramedia*, 2021), content that often evinces the structural problems of the Latin American and Caribbean region, in constant opposition to the interests established by a powerful minority, placing their status in question (**Galván**, 2022; **Rincón**, 2010). The challenge could then be presented as how to guarantee the free and safe exercise of journalism, in a way that does not entail risk to the journalist's integrity. This challenge becomes complex for media entrepreneurship. According to the *Foundation for Free Press* [*Fundación para la Libertad de Prensa*] (n.d.), there are 27 ways in which violence against journalists may be perpetrated. Digital native media outlets in Ibero-America have faced this burden over the last years (*Sembramedia*, 2021): 40% of them have been threatened, while 51% have been the target of cyberattacks –from social media profile supplantation to hacking that has taken down their websites, among others.

A further risk that entrepreneurs in the information media face is financial failure and bankruptcy. It may manifest from two perspectives, one external and another internal to the entrepreneurship.

- From the external dimension, emergent media are constituted in a competitive context in which, regardless of a varied and ample content offering, audiences distrust media, consumption of news has gone down, and younger consumers are reticent to paying for information (*Reuters Institute*, 2022). The business models that maintain the industry have been unable to address unforeseeable circumstances and emergent situations, including the one experienced during the Covid-19 pandemic, developing increasing dependence on funding and grants from the State (*Unesco*, 2022). The challenge, in this aspect, arises from the capacity of new media entrepreneurship to generate value offers that satisfy the needs of audiences and customers who have an expanding collective mindset (**Carvajal** *et al.*, 2022; **Sáez-Baeza**, 2020).

- From an internal dimension, the new entrepreneurs of communication lack education or experience (*Unesco*, 2022), which prompts entrepreneurial pursuits based on trial and error and informed by intuition (**Ventín-Sánchez**, 2021). The profiles and competencies of media entrepreneurs are focused on content production (*Sembramedia*, 2018) and not on media management or administration, so their financial sustainability and profitability are not properly developed. Apart from the transformation of the media industry, market evolution and the changing professional profile of journalists (**Sabés-Turmo**; **Verón-Lassa**, 2012), education in journalism entrepreneurship needs to be reinforced.

The most recent study by *Sembramedia* (2021), shows that out of 201 digital native media studied, more than 60% were classified at the lowest two levels of business development or did not report their income in 2019, which is due to many entrepreneurs working with low financial security and meager investment in their business development. On the other hand, the report highlights that 88% of the organizations of digital native media in Latin America have founders specialized in journalism and, in 37% of the cases, they are the ones who undertake fundraisers and business development. This means that

> "the chances of success by digital entrepreneurs could increase if current leaders were trained, and courses on entrepreneurial journalism, business and innovation were created in journalism schools to better prepare future media directors" (*Sembramedia*, 2021, p. 107, our translation).

The call for universities to provide training for journalism entrepreneurs is not new. **Sabés-Turmo**; **Verón-Lassa** (2012), **Casero-Ripollés**; **Cullell-March** (2013) and **Rafter** (2016) have pointed out that, before the crisis of the traditional media

business model and the precarization of journalists, the most certain option for future journalists was to self-employ in new digital media outlets. This position has been reinforced by recent studies, where researchers have shown that media developed on the web are better at capturing young audiences through innovation, the use of multiple digital tools and platforms, and content specialization (**Paniagua-Rojano**; **Vera-Hernández**, 2021) and that there is a need to re-define routine concepts and practices that describe journalists, bearing in mind that many of them are entrepreneurs or independent (**Deuze**; **Witschge**, 2017).

> "The business models that maintain the industry have been unable to address unforeseeable circumstances and emergent situations, including the one experienced during the Covid-19 pandemic, developing increasing dependence on funding and grants from the State"

Looking at the work prospects of recent graduates, associations channel the demands regarding regulation of remuneration and working conditions, the fight against uncertified participation, and the defense of the professional image of journalism along its main values, including freedom of expression (**González-Cortés**; **Paniagua Rojano**, 2008). Low wages and long working hours are factors with high negative impact (*Asociación de la Prensa de Madrid*, 2021; **Gutiérrez-Coba**, 2020; **Gutiérrez-Atala** *et al.*, 2016). The entry of young people to the sector, and especially to the traditional market (**Sabés-Turmo**; **Verón-Lassa**, 2012; **Paniagua**-**Rojano** *et al.*, 2014), is impacted by the crisis of these outlets and the need to provide new business models for the new platforms (**Sabés-Turmo**; **Verón-Lassa**, 2012). **Sánchez-Tabernero**'s 2008 study provides examples of large international companies that had massive decreases in their margins: paid radio outlets in the US had to merge to avoid bankruptcy; European free newspapers experienced high loses in revenue; and decreasing advertisement incomes was reported by the largest US newspaper publisher as well as in the audiovisual sector, among other alarming prospects.

The previously highlighted issues informed the aim of the research project to analyze social communication and journalism programs in universities in Latin America to identify the strengths in the development of skills in media entrepreneurship and innovation. The following specific objectives were set:

1. Identify media entrepreneurship and innovation skills in the graduate profile presented by the social communication and journalism undergraduate programs.

2. Identify the offer of courses designed to train students in media entrepreneurship and innovation.

3. Find the connection between the research outcomes proposed and the practical relevance of the courses in media entrepreneurship and innovation.

2. Understanding entrepreneurship

Entrepreneurship has become the object of a variety of research processes since it began to be taught at education institutions (**Cabeza** *et al.*, 2017; **Byrne**; **Fayolle**, 2010). This development can be seen in the increasing number of courses and programs on the subject (**Kuratko**, 2005; **Gibb**, 1993), and the generation of an ecosystem that links more actors and promotes interest in the area (**Malecki**, 2018).

Some researchers have mentioned that entrepreneurship is an ample, complex and heterogenous domain (**Gartner**, 1985; **Verstraete**; **Fayolle**, 2005) to be encapsulated by one single definition (**Verstraete**, 2000). Thus, definitions of entrepreneurship tend to include, as stated by **Filion** (2004), the characteristics of the entrepreneur as a person (leadership, anxiety…), the factors related to the activities, and the start of these actions (value generation, innovation, coordination…) or the factors related to the possible influences upon the context (generation of dynamics within the economic sector). Therefore, it becomes relevant to analyze entrepreneurship under a global perspective, bringing together various positions. **Verstraete** and **Fayolle** (2005) do so when they present four notions as basis to define entrepreneurship:

- business opportunity;
- organization creation;
- value creation, and
- innovation.

We include a fifth notion related to entrepreneurship as a process, arising from the proposal of **Gartner** (1995), which combines four dimensions: the individual, the organization, the context under which the actions are carried out and the processes. For Gartner, the notion of process is aimed at the creation of new activities.

On the motivation for entrepreneurial endeavor, literature has highlighted as its main reasons opportunity or necessity (**Acs**, 2008). Finding a good opportunity in the market is not the only way to start a business. A business may be started by someone, because there is no other option to avoid unemployment (**Mota** *et al.*, 2019). Usually, entrepreneurship based on opportunity tends to have more influence on the economic growth of nations (**Liñán**; **Fernández-Serrano**, 2014). A third motivation can also be conceived: transition. This is part of the options of the motivation variable and recognizes the complex and dynamic character of motivation to start a business (**Puente** *et al.*, 2019). According to these authors, the dynamic characteristics of "transition" refers to the individual who may currently be under employment but

hopes to become an entrepreneur moved by opportunity or may want to continue carrying out both activities. However, it must be borne in mind that entrepreneurship with technology and highly innovative proposals may also become viable "motors of economic development" (**Lecuna**; **Cohen**; **Chávez**, 2017; **Dilli** *et al.*, 2018).

> Before the crisis of the traditional media business model and the precarization of journalists, the most certain option for future journalists was to self-employ in new digital media outlets

For **Ibarra**, **Ganzarain** and **Igartua** (2018), innovation and entrepreneurship stand out when technologies offer new possibilities. Innovation may include improvements in efficiency making continuous and incremental advances in technology or processes, or disruptive changes in technology and processes that may lead to the creation of new revenue streams (**Lu**, 2017). It underscores the chances of entrepreneurs to develop innovation and progress in a variety of professional fields (**Mazzei**, 2018; **Schmitz** *et al.*, 2017), including digital media. The influence of innovation, particularly in the 4.0 industries has contributed to the expansion and interdependence of industries (**Ghobakhloo**, 2018), providing a link between customers, employers, processes and suppliers to create new opportunities through shared collaboration platforms (**Audretsch** *et al.*, 2019), for instance. In this context, entrepreneurs have reached the potential to create brand-new proposals to offer goods and services in the market (**Van-der-Westhuizen**; **Goyayi**, 2019), where the entrepreneurial spirit shows its intercultural and transnational innovation potential (**Fraiberg**, 2013; **Williams** *et al.*, 2016).

Bearing in mind that entrepreneurship is of great relevance to media (**Hang**; **Van-Weezel**, 2007), entrepreneurial journalism (**Cha**, 2020; **Khajeheian**, 2017; **Casero-Ripollés**; **Cullell-March**, 2013) has drawn considerable academic and practical attention (**Hang**, 2020; **Singer**; **Broersma**, 2020; **Fulton**, 2019). Journalism has evolved in the last quarter century displaying major changes as a discipline (**Cabrera-Méndez** *et al.*, 2019). In this evolution, the concept of entrepreneurial journalism arises alongside autonomous journalism and self-employment. Entrepreneurial journalism is linked to the ability to work in new formats, which are predicated upon viable business models based on innovation and implies ample professional independence (**Cabrera-Méndez** *et al.*, 2019). It may be defined as the creation and property of a business or organization whose activity adds at least one voice or innovation to the media market (**Khajeheian**, 2017). For entrepreneurial journalism to identify a business opportunity in the media industry is to come to grips with the unsatisfied needs of a niche market willing to pay to see those needs satisfied (**Khajeheian**, 2017). In the case of journalism and media, it is insufficient to be open-minded about the people working in it, there is a need to be able to manage creative staff (**Lowe**, 2016). Furthermore, digital technologies are lowering the entry barriers to journalism, since internet tools fill their gaps in skills, resources, and technical know-how, reduces associated with commercialization and establishing connection with partners to market their products, services and brands (**Harris**; **Rae**, 2009). Many journalists have opted to create their own media, mainly in the digital environment, developing content and managing their businesses (**López-Meri**; **Alonso-Muñoz**; **Casero-Ripollés**, 2020). This has enabled the rise of new strategies based on self-employment (**Goyanes**, 2015) and demonstrates that, in the practice of journalism, there is "considerable" entrepreneurial intension (**López-Meri**; **Alonso-Muñoz**; **Casero-Ripollés**, 2020) whether because of self-motivation or need (**Buschow**; **Laugemann**, 2020). According to the studies by **Casero-Ripollés** and **Cullell-March** (2013) entrepreneurial journalism has become a professional option that should be actively encouraged via university education.

3. Business models

In the previous years, the traditional way of developing business models has been redefined, demanding the development of a formal plan before the implementation stage. The business model may be defined as the way in which an organization articulates dynamically its main components to generate revenue and keep it flowing in a sustainable manner. The business model describes and synthesizes the way to create value in a business, conceptualizing the various activities of an enterprise with the aim of generating value for the interest groups. For instance, the *Canvas* model favors the dynamics of the project encouraging comprehension, creativity and reflection on the same entrepreneurial project (**Osterwalder**; **Pigneur**, 2016). The *Canvas* model enables the profiling and description of an entrepreneurial project through 9 aspects: market segment, value offer, channels, customer relations, income sources, key resources, key activities, strategic alliances and costs structure. On the other hand, there is the *Lean StartUp* model, which proposes a different way to assess the progress of an entrepreneurship, focusing

> "on the quick iteration and knowledge of the consumers, with great vision and ambition" (**Ries**, 2012, p. 32).

Digital journalism companies have been studied from a variety of vantage points:

- based on the finance strategies in relation to the rigidity and the flexibility of pay walls (**Cerezo**, 2019; **Simon**; **Graves**, 2019);
- from the role of the market segments and functional relationship with the media audiences (**González**-**Bernal** *et al.*, 2018);
- via the key resources and activities in professional practice (**Martin**, 2019);
- looking at the distribution systems (**Nieborg**; **Poell**; **Deuze**, 2019);
- stemming from the concept and assessment of contents in crisis contexts (**Díaz-Noci**, 2019);
- analyzing the type of alliances that are established in the digital ecosystems of digital social media (**Méndez-Nieto**; **Rivera**; **Palomo-Torres**, 2018); or
- looking at the management systems and business organization (**Sánchez-Tabernero**, 2000).

Thus, there is room to present a complex and correlational focus of different strategies that would help to make decisions regarding consumers, technology, identity and competitiveness (**Gans** *et al.*, 2018) enabling the design of journalism business models both sustainable and profitable.

4. Learning by competencies

Education has followed different paths the world over (**Hagebakken**; **Reimers**; **Solstad**, 2021). Whereas some parts of the world consider that the objective of education is to teach concepts to students, others hope for them to develop skills that would lead them to achieve this knowledge on their own. Basically, there is a division between learning and doing, the latter taking place in those places where ideas are applied though a pedagogy based on action. Thus, people learn through experience and discovery (**Rae**; **Carswell**, 2000) and they are considered as stages in which knowledge is created through the transformation of experiences (**Kolb**, 1984). In fact, the focus on competencies holds that with experience and training, development and learning (**Kyndt**; **Baert**, 2015) may be achieved in any discipline.

The focus on competencies is considered a tool that offers a way to do and a common language for the development of human resources. Competencies are not just trained at one moment in life. Training of competencies influences the learning process of the person throughout their life, before and after university graduation, including within family and as part of society (**Arévalo-Coronel**; **Juanes-Giraud**, 2022). In the process of education though competencies, educators or facilitators may contribute by fostering questions that foster analysis and by offering spaces to engage with these debates in the classroom (**Kakouris**; **Liargovas**, 2020). Developing critical thinking becomes fundamental at the beginning of professional activity where the challenge to analyze and think creatively arises, and problems must be addressed from multiple perspectives to find an appropriate solution (**Leão**; **Ferreira**, 2022).

Through this way, institutions incorporate in their curricula education models that promote abilities and knowledge and which integrate theory and practice according to the respective discipline (**Davidsson**, 2014). Curricula developed in this manner and taught under the competencies model include extracurricular activities and fieldwork, which contribute to the development of cognitive and behavioral skills, and for those skills to be transferable (**Tan** *et al.*, 2021). Also, the need to promote transversal research skills at university arises, to foster reflections on the problems of their own surroundings and the search for their appropriate solutions (**Chávez-Vera** *et al.*, 2022).

Specifically on entrepreneurship, **Martínez** and **Carmona** (2009, p. 84) mention entrepreneurial competencies (ENCO) as those that train people in their personal (autonomy and self-realization), social (social and environmental responsibility) and economic (entrepreneurial project) dimensions so that they may develop a project that generates economic growth and social cohesion.

4.1. Entrepreneurship and training in communication areas

Universities have become incrementally invested in including entrepreneurship in their education programs. In some cases, they have gone as far as to redeploy themselves as centers of economic and entrepreneurial growth (**Veugelers**, 2016). Within education institutions entrepreneurships have been created, thanks to the intervention of professors, students, researchers and local employers (**Pellegrini**; **Johnson-Sheehan**, 2021).

For the media sector, changes in the last years have led entrepreneurship to provide new business models that may be promoted through university education (**Aceituno-Aceituno** *et al.*, 2018). The preparation of the students in the media landscape, according to **Deuze** (2019), demands for an integration of theory and practice to foster creativity in journalism and communication curricula. That way, critical analysis is fostered, while practical skills are improved. Within the institutions, students marry theory and practice to develop their creativity all along their studies, ensuring they comprehend the influence theory has on praxis and practice upon theory, which is a process that takes place until the end of their academic journey.

The chance to work in a creative system may provide the students with tools to become entrepreneurs in any area of journalism and communication (**Fulton**, 2019). And the education on these professions has shown the importance of adopting a rather practical focus, up-to-date and interlinked with the commercial world, which enables new opportunities for development where future generations of journalists fulfil their social function (**Aceituno-Aceituno** *et al.*, 2018). On this point, several authors have established the need to explore new pathways for media businesses (**Campos-Freire**, 2010; **Casero-Ripollés**, 2013), with entrepreneurship seen as the most recommended route to foster work and self-employment in the digital content industry.

5. Methodology

A descriptive, qualitative study was selected, since this type of studies tell, recover, study or identify facts, situations, traits, characteristics of a study object, particularly when the interest is to understand the who, what and how of events (**Sandelowski**, 2000; **Bernal-Torres**, 2016). For this study, 22 curricula of undergraduate programs in Communication and/or Journalism were selected for analysis, all of them holding a certification granted by the *Latin American Council for Accreditation in Education in Journalism and Communication* (*Consejo Latinoamericano de Acreditación de la Educación en Periodismo y Comunicación*, *Claep*) and valid for the first semester of 2022. Only 17 of the 22 programs became active part of the study (see Table 1), since four of them did not reply to requests for information and participation in the study

(three programs in Colombia and one in Perú), and the Social Communication and Journalism undergraduate program at *Universidad de La Sabana*, in Colombia, was removed from the sample, because it is the institutional affiliation of the researchers leading this study.

Table 1. Academic programs studied by country

Country	Number of programs	Institutions
Colombia	7	*Universidad Autónoma de Bucaramanga* *Universidad Externado de Colombia* *Universidad Pontificia Bolivariana* *Colegio Mayor de Nuestra Señora del Rosario* *Corporación Universitaria Minuto de Dios* *Corporación Universitaria Minuto de Dios Sede Bello- Antioquia* *Universidad Jorge Tadeo Lozano*
Ecuador	3	*Universidad de los Hemisferios* *Universidad Técnica Particular de Loja* *Universidad de Especialidades Espíritu Santo*
Mexico	4	*Universidad Anáhuac Mayab* *Universidad Anáhuac México Norte* *Universidad Anáhuac Cancún* *Universidad Iberoamericana*
Chile	1	*Universidad Católica de la Santísima Concepción*
Perú	1	*Universidad Peruana de Ciencias Aplicadas (UPC)*
Argentina	1	*Pontificia Universidad Católica Argentina*
Total	17	

In-depth interviews were carried out with the program directors of all 17 programs and, in five of them (*Universidad Externado de Colombia*, *Universidad Autónoma de Bucaramanga*, *Universidad Minuto de Dios Antioquia branch*, *Universidad Iberoamericana*, *Universidad Católica Argentina*) interviews included lecturers in charge of the courses that address topics related to competencies in entrepreneurship and innovation. Lecturers participated alongside the program directors in the interviews to provide nuanced detail about the methodological aspects of the courses. The base questionnaire applied asked about aspects such as the importance placed by the program to foster this type of skills in their students, their commitment according to the statements in their graduate profile, the way they develop these competencies through the curriculum, the teaching-learning strategies, the assessments made in the courses related to these topics and the existence of institutional support for entrepreneurship that sponsors ideas developed by the students.

Furthermore, content analysis was carried out on the syllabi of the courses aimed at the development of entrepreneurial skills taught in each of the undergraduate programs. The instrument had 13 variables, divided in three categories: 1) General information of the program (name, country, institution, number of semesters of the program); 2) information on the courses related to entrepreneurship in each program (names, semester in which it is taught, type of course and form of delivery); 3) information on the strategies for the development of competences (skills developed by the course, contents, expected learning outcomes, strategies for teaching-learning, assessment system) (see Table 2 for a summary of the definitions of the variables).

Table 2. Variable description

Item	Description
Cycle or semester	Period in which the course is taught in the study plan.
Type of course	Defined according to the mandatory/elective role of the course: core/mandatory (must be taken as part of the coursework) or elective/optional (course that may be freely selected by the students).
Form of delivery	Presence (face-to-face in the classroom), remote (synchronic, mediated by technology), virtual (combines a variety of synchronous and asynchronous processes mediated by ICTs) or mixed (allows for some students to be face-to-face, while others are linked synchronically by videochat).
Competence	The set of knowledge, skills and abilities with which the student may face the challenges of their professional activity, according to the graduate profile.
Expected learning outcome	The statements regarding what is expected for the students to know and prove upon course completion.
Contents	The units of information/knowledge that make up the course.
Strategies of teaching and learning	Procedures or resources used by the lecturer to develop meaningful learning.
Assessment system	The procedure of follow-through and control of the pedagogical process and learning by the lecturer and student, which defines the marking/grading.

6. Results

The 17 curricula analyzed serve to determine, from their description, the orientation of the programs towards communication, journalism or a combination of both: Social communication and journalism. Out of them, 11 programs required eight academic semesters to be completed, five of them are nine semesters long and only one of them demands 10 semesters. An academic semester is usually four months long, with 16 to 17 weeks of study, in which the courses are distributed. Some courses are compulsory or mandatory, because they allow the development of the main professional competencies that all students should develop, whereas other courses are elective, which implies that students may select the courses according to their personal interest to complement their education.

There is a consensus among the program directors interviewed about the relevance that entrepreneurship has for the students of these programs, especially considering the difficult labor conditions that journalists are experiencing (**Gutiérrez-Coba**, 2020; **Gutiérrez-Atala** *et al.*, 2016) and the impact of technological changes upon the business of media enterprises (**Marta-Lazo**; **González-Aldea**; **Herrero-Curiel**, 2018). Thus, in their interviews, the program directors confirm the importance of training in entrepreneurship. Víctor Rodríguez, program direction of the Social Communication and Journalism program at *Universidad Externado de Colombia* states that

> "before the pandemic, but even more now, entrepreneurship is one of the alternatives for new professionals and particularly in our field of social communication and journalism to answer to the new reality of the professional market".

However, they also highlight that they still face challenges. Juan David Bernal, director of the program of Communication at *Universidad de los Hemisferios* in Ecuador explains that

> "we are good in ideas, we are good in product development strategies, but we still must teach the students how to understand costs and develop appropriate budgets to attain sustainability. Ecuador is in the top 3 of countries with more entrepreneurships in the world, but also has a high failure rate and most start-ups do not make it to a second year".

Another aspect they highlight is the need for the entrepreneurial process creation to extend beyond the courses in each program for the development of the relevant skills, but for them to be supported by acceleration and incubation units created by their own universities to transform those good ideas into a reality beyond the classroom. Most of the projects tend to remain on paper or as a resource for the course, but do not continue further. Only six of the universities studied have institutional support divisions to foster the entrepreneurial projects developed, both student-led and from interested third parties, through counsel or contestable funding to receive financial support. Even those that have entrepreneurship centers indicate that it is necessary to work on the development of better links with the academic programs, as pointed out by Diego García, director of the Journalism and Public Opinion program at *Universidad del Rosario*:

> "this university is interested in creating an extended ecosystem regarding entrepreneurship. The entrepreneurship center opened business model workshops and we offered them [to our students], so that those students who wanted to take them could do so, but because of the singular nature of our field of knowledge, I believe it remains a challenge to work in the creation of media outlets along with the entrepreneurship center".

6.1. About the competences in entrepreneurship in the professional profile

The *International Labor Organization* (*ILO*) (*OIT* 1993, p. 10) defines professional competence as the

> "suitability to undertake a task or carry out a job successfully by having the qualifications for it".

In the same document *ILO* defines professional education as

> "the set of activities aimed at providing the theoretical and practical knowledge and the capacity required to perform an occupation or various functions competently and with professional efficacy" (p. 39).

Thus, curriculum design must guarantee that the students will develop the skills to identify themselves with a certain professional or graduate profile. That is to say, by completing the course of studies, the graduate should have the set of skills demanded to perform adequately the activity for which they have studied (**Vargas-Zúñiga**, 2004).

Following **Corvalán-Vásquez** and **Hawes-Barrios** (2006, p. 9), the graduate profile is a

> "set of traits and skills that, properly certified by whoever has the legal competence, allows for someone to be recognized socially as a professional, who can be assigned task for which they are prepared and competent".

Similarly, in the graduate profile, the job titles to which the student may aspire in the job market are presented. Therefore, the statement of the graduate profile offered by an academic program is no minor thing, because it highlights the commitment that the HEI acquires with the education of a person that will be delivered to the society to carry out a productive endeavor. By declaring the graduate profile as someone with the skills to create new media enterprises or who can manage their own media company, it is a value promise that the institution makes and are required to fulfil.

In the case of the 17 programs analyzed, eight of them state in their professional or graduate profile that they are competent in entrepreneurial skills. Out of them, five are taught at universities in Colombia and three at universities in

Ecuador. However, this does not mean that those that fail to state this competence are not providing training in the skills or that those who do are fulfilling the expectations set by the profile statement.

The first thing to bear in mind is that if a competence is stated in the graduate profile of a program, it means that all the students develop said skill, and therefore, the courses that develop those skills should be compulsory or mandatory and not optional or elective. Eight of the programs satisfy this requirement.

Secondly, it is important to consider that entrepreneurial competence may be developed in more than one course and may answer to personality traits, including self-confidence, self-efficacy or resilience (**Kerr**; **Kerr**; **Xu**, 2018); behavioral traits, such as autonomy, team work, negotiation skills (**Hodzic**, 2016; **Teague**; **Gartner**, 2017; **Ortiz-Valdés**, 2020), and operational/conceptual traits, like project management and planning or resources administration (**Ibáñez-Cubillas**; **Gijón-Puerta**, 2021), which would be expected to be developed along the curriculum in different moments and scenarios.

However, competencies of the operative/conceptual kind (**Ibáñez-Cubillas**; **Gijón-Puerta**, 2021, p. 7), generally demand specific academic spaces for their development, which allow for the students to address the necessary aspects to materialize their business idea:

- Resource collection (ability to capture and distribute resources in an orderly fashion, be they ideas, objects, materials, human resources, etc.);
- Resources management (resource acquisition, allocation and administration, including people and their skill-sets, finances, technology, materials, equipment and natural resources needed for a project);
- Project management (applying knowledge related to principles, techniques and tools used in project planning, control, monitoring and assessment);
- Project planning (systematic sequencing and distribution of tasks);
- Leadership and delegation (way in which a leader transfers decision-making powers to one or more employees, but remains responsible for their decisions);
- Finance operation (activities involved in the daily tasks of the business, carried out to generate revenue).

Because of the above, to develop entrepreneurial competences in all aspects, the study program should be supported in many courses, some of which are specifically designed for that purpose. In this case, only two out of the eight that claim to educate in entrepreneurial competence include more than four courses in their curriculum to teach these skills. Another two offer two courses and four of them only offer one course.

Table 3. Specific courses on entrepreneurship in each of the programs that **attests** to the competence in the graduate profile

Institution	Number of entrepreneurship courses	Courses
Universidad de Especialidades Espíritu Santo	5	Audiencias y Plan de Medios [Audiences and Media Plan] Desarrollo Sostenible [Sustainable development] Inteligencia de Mercado [Market intelligence] Liderazgo, emprendimiento e innovación [Leadership, entrepreneurship and innovation] Metodologías de la innovación [Innovation methodologies]
Universidad de los Hemisferios	4	Creatividad e innovación [Creativity and innovation] Laboratorio de proyectos experimentales de comunicación [Experimental communication projects lab] Gestión de proyectos de Comunicación social [Social Communication project management] Laboratorio de empresas y emprendimiento de comunicación [Business lab and communication entrepreneurship]
Corporación Universitaria Minuto de Dios	2	Emprendimiento [Entrepreneurship] Emprendimiento creativo [Creative entrepreneurship]
Universidad Jorge Tadeo Lozano	2	Dirección organizacional [Organizational management] Gestión en comunicación [Communication management]
Universidad Técnica Particular de La Loja	1	Emprendimiento [Entrepreneurship]
Universidad Externado de Colombia	1	Emprendimiento y estrategias de liderazgo [Entrepreneurship and leadership strategies]
Corporación Universitaria Minuto de Dios, sede Bello	1	Emprendimiento [Entrepreneurship]
Pontificia Universidad Católica Argentina	1	Proyecto informativo [Informative project]

Also, some of the institutions that do not state entrepreneurial competence as part of the graduate profile, have a clear path of courses in this field.

Table 4. Specific courses on entrepreneurship in programs that do not state the entrepreneurial competence in their graduate profile

Institution	Number of entrepreneurship courses	Courses
Universidad Iberoamericana	4	Emprendimiento periodístico y plan estratégico [Journalistic entrepreneurship and strategic plan] Revisión de proyecto periodístico crítico y construcción de agenda [Project review on critical journalism and agenda setting] Sistema de medios y culturas del periodismo [Media systems and journalism cultures] Intrapreneurship
Universidad Peruana de Ciencias Aplicadas	4	Design thinking Emprendimiento de Negocios Sostenibles: Formulación [Sustainable business entrepreneurship: Formulation] Emprendimiento de negocios sostenibles: Implementación [Sustainable business entrepreneurship: Implementation] Estrategias de Negociación [Negotiation strategies]
Universidad Autónoma de Bucaramanga	3	Identidad y emprendimiento [Identity and entrepreneurship] Gestión de departamentos y empresas de comunicación [Communication department and enterprise management] Comunicación y gestión de proyectos [Project communication and management]
Universidad Anáhuac México Norte	3	Creatividad e innovación publicitaria [Advertisement creativity and innovation] Habilidades para el emprendimiento [Entrepreneurial skills] Emprendimiento e innovación [Entrepreneurship and innovation]
Universidad Anáhuac Cancún	3	Creatividad e innovación publicitaria [Advertisement creativity and innovation] Habilidades para el emprendimiento [Entrepreneurial skills] Emprendimiento e innovación [Entrepreneurship and innovation]
Universidad Pontificia Bolivariana	3	
Universidad Anáhuac Mayab	2	Creatividad e innovación publicitaria [Advertisement creativity and innovation] Habilidades para el emprendimiento [Entrepreneurial skills] Emprendimiento e innovación [Entrepreneurship and innovation]
Universidad del Rosario	1	Empresa informativa [Information enterprise]
Universidad Católica de la Santísima Concepción	0	Six courses deal with generic entrepreneurial skills (leadership, ethics, resilience, etc.), but not with operative/conceptual skills

The information previously presented shows that the analyzed academic programs have improvement opportunities when it comes to stating their graduate profile. On the one hand, those that state this competence in the profile, must pay attention to offer a clear series of courses that address the required operative/conceptual skills, alongside behavioral and attitudinal ones. In those programs which do not present entrepreneurial competence as part of the graduate profile, but do develop it, should redefine the profile, so that it reflects these aspects. For those who do not declare the competence and do not address it clearly in their courses, it is an opportunity to reflect on whether, depending on the job context in each country, entrepreneurship constitutes a necessary competence, to chose to include it in their graduate profile and study program.

6.2. Courses for competences on media entrepreneurship

The work of **Aceituno-Aceituno** *et al.* (2018) has shown that recent changes have led universities to promote entrepreneurship to develop new media business models. This observation agrees with the results that show that all 17 universities offer courses specifically on entrepreneurship. These courses are mostly (36) compulsory with a few of them (6) on offer as electives. Most universities mention they recognize the need to foster and support the entrepreneurial spirit in their students. According to the program director at *Universidad Externado de Colombia*, Victor Raúl Rodríguez Puerto,

> "as a response to the new reality in the professional job market, especially in our field of Social Communication and Journalism".

As stated by **Campos-Freire** (2010) and **Casero-Ripollés** (2013), in the media sector there is a need to explore new ways to generate business.

Entrepreneurship is a process (**Gartner**, 1995) that covers the individual, the organization, the context and the actions undertaken. This contributes to the establishment of a path in which the entrepreneur learns and unlearns throughout their entrepreneurial life, according to the needs of the project. The results show that the analyzed institutions teach mandatory courses in the first semesters, such as entrepreneurial spirit, creative thinking and entrepreneurial perspective which help define the ideas, and later on in their study plans they offer other courses, also mandatory, related to the construction of communication projects, management, and company creation which, in some cases, have a business plan as outcome. Since an entrepreneurial spirit can be observed in future journalists (**Gómez-Aguilar**; **Paniagua**, 2015), education in entrepreneurship should be experienced as a space in which students apply new knowledge, but also understand the project as a life choice. However, the results show that the connecting thread between the courses must be strengthened, so that it begins with the initial business idea and knowledge and skills acquired in later courses are

applied to it. Competencies are acquired in each course according to the respective syllabus, but they do not reach a level in which they are linked and applied to one single entrepreneurship project throughout the entire study program.

On the other hand, the courses taught start from the identification of problems until the proposal of innovative business ideas. They include topics such as opportunity generation, managerial aspects, organizational structure, leadership, among others. Regardless, there is still a gap in addressing issues like business formalization, monetization, and budget and cost calculations. Furthermore, although the idea may be new for a niche market, in some cases there are gaps surrounding how to make the business sustainable in the long run. That is the reason why, as mentioned by **Deuze** (2019), theory and practice of journalism and communication have to be integrated. Thus, it is relevant to offer courses in the classroom that provide tools to structure a business plan, and attain a higher level, where prototypes are validated by the target market and experts in the field, aiming to develop a minimum viable product. This means that the universities consider the development of transversal research competences which stimulate reflections about main problems in the social and economic environment and the definition of appropriate solutions (**Chávez-Vera** *et al.*, 2022). And in this specific case, the constant search for, and analysis of, relevant information that helps in identifying the new ways in favor of business sustainability in the media sector. For instance, sustainable models focused on different digital platforms and tools and their specificity according to their audience (**Paniagua-Rojano**; **Vera-Hernández**, 2021).

It is possible to identify that some programs, based on feedback from graduates, include topics about media and business management. As mentioned by the academic director of the program at *Universidad Peruana de Ciencias Aplicadas*, Rossana Echeandía Escudero,

> "it is not enough developing writing skills, they should also know how the digital business operates".

To achieve that goal, the analyzed programs offer elective courses related to entrepreneurship because even though the students should understand how the business and management of media works, not every student feels the desire to be an entrepreneur. Then, understanding that business behavior is influenced at the micro level by the personal traits and a person's access to resources (**Adekiya**; **Ibrahim**, 2016), and on a macro level, by the environmental factors and institutions surrounding them (**Entrialgo**; **Iglesias**, 2016), it is worth including new types of initiatives in entrepreneurial education to promote the entrepreneurial intention (**Block**; **Fisch**; **Van-Praag**, 2017); additionally, to include initiatives that enable interaction with potential entrepreneurs, incubators or other entities that lead entrepreneurs to better identify and understand the positive and negative aspects that underscore the steps from intention to action (**De-Sordi**, 2022) in entrepreneurship.

In all the cases studies, the first course in the study plan related to entrepreneurship focuses on the discovery process in which needs and problems are addressed. To that end, the educators may contribute to the development of skills, offering questions that favor the analysis (**Kakouris**; **Liargovas**, 2020) of problems from multiple perspectives, to reach an adequate solution (**Leão**; **Ferreira**, 2022) that ends in a business idea. That is why it is not enough with describing the competencies within the syllabi, proper assessment and evaluation methodologies have to be put in place as well. On this aspect, the institutions that are part of this study apply methodologies which include design thinking to generate ideas, *Lean Startup* to determine the value offer, and the *Canvas* model to understand the dynamics between the elements that make up the business model (**Osterwalder**; **Pigneur**, 2016). Regarding evaluation, most universities carry it throughout the process, and even though there is a final output to assess, a stage-by-stage evaluation is done to verify the advances toward the expected learning outcomes. This includes partial deliverables, reading assessments, presentations, among others. Finally, not only is the project deliverable or business plan evaluated, also a pitch presentation is done under a professional format, to sell their business model. The pitch exemplifies the development of skills regarding time management (usually under 5 min), synthesis (problem, solution, resources, data...), information analysis, oral expression and emotions' management.

6.3. On the expected learning outcomes in relation to the relevant practice of entrepreneurship

Following the analysis of the expected learning outcomes in the courses that contribute to developing entrepreneurial and innovation skills, eight components of practical nature can be identified, which enable conceptualization, design and establishment of emerging media:

- identify the contextual conditions that shape the entrepreneurship, based on the way they are classified to be acknowledged before the State and society as media and from the elements that make up their operations;
- understand the logics of the entrepreneurial ecosystem;
- develop entrepreneurial capabilities;
- manage journalism and media projects;
- design business models;
- generate innovation, prototyping and testing of products;
- obtain resources to accelerate the entrepreneurship; and,
- map out growth and establishment plans.

Media companies, as industrial agents of communication, are embedded in complex environments that demand systemic foci for their study, to comprehend their social and business functionality. Any starting analysis of media entrepreneurships may be explored looking at three conditioning structures (**Ventín-Sánchez**, 2018):

a) their contextual structure which determines the reach and forecast of the medium, based on a specific geographic and temporal circumstances, and an analysis of social, cultural, political, economic, technological and environmental aspects;

b) the formal structure, where a series of elements define the way in which a medium is acknowledged by the State and society at large, including the regulation and business frameworks, the legal standing, the organizational purpose, the market segment it is aimed at and the type of product and benefit it seeks, and

c) the functional structure that builds the form of operation of the medium according to the type of organization, the production and distribution systems, etc.

On the contextual structure we find that, although the programs define learning outcomes (LO) centered in analysis, these are limited to economic factors. Every entrepreneurial project must understand the environment a new media outlet would inhabit, and should arise form an analysis of the social, cultural, technological, political and environmental criteria that define and condition its viability and sustainability.

Regarding the formal structure, the programs identify the regulation framework as the main aspect to be addressed when establishing media enterprises, but they do not specify whether they look at business, fiscal, or media perspectives. On the market segment, all the LO of the programs studied are focused on the audiences and do not offer a study of the customers (companies or organizations which hold interests in the message or commercial intention of the medium) to identify their needs. It is likely that the programs focus on the trends of audience participation and on financial models based on subscription or membership (**Cerezo**, 2019). However, audience sales, understood as product (**Ventín-Sánchez**, 2004), remains the most common form of media financing in the media industry (*Sembramedia*, 2021; *Reuters*, 2022; **Tejedor** *et al.*, 2020). This is precisely another aspect that is not mentioned in the studied LOs, since they only offer as products the information and communication contents instead of the audience.

The teaching and learning strategy most often quoted by the programs to achieve these LOs is through an expository or theoretical lecture. This is an ideal method to bring about recent information, organized according to a variety of sources, which allows for topics, situations and contexts to be covered (**Gómez**, 2002). The main learning resources used are visual slides, academic texts and statistics from governmental reports. The assessment methods mainly include written assignments, reports and exams, with oral assessments such as debate groups or presentations also used, albeit less often.

Table 5 provides a proposal that pairs up expected learning outcomes along the lines of how they contribute to strengthen the practical relevance of the course, to identify the conditions that determine the entrepreneurial effort for media outlets, taking into account their context, the form they take to be acknowledged by the State and society as media, and the elements that shape their operational procedures.

Table 5. Proposal of expected learning outcomes with practical relevance for the factors that define an entrepreneurial effort

Component with practical relevance	Identify the conditions that determine media entrepreneurship arising for the context, the form they take to be acknowledged by the State and society as media, and the elements that shape their operational procedures
Expected learning outcomes (LOs)	**1. Context analysis:** - Analyzes the economic, social, cultural, political, technological, and environmental situation in regard to the entrepreneurship to be developed. - Reflects on the opportunities for professional development as a communications entrepreneur based on the local, regional, national and international context. - Recognizes the characteristics of its environment through observation and interaction in different venues that allow for opportunities to be seized. - Defines the market aspects that ensure the sustainability of the entrepreneurship. **2. To determine the way society acknowledges its role** a) Regulatory framework - Identifies the regulations in place that position the entrepreneurship according to the fiscal, media, and administrative rights and obligations as a communications enterprise. b) Entrepreneurial purpose - Defines the media organization based on its economic activity, legal standing, mission, vision and values. c) Market segmentation - Identifies the target audience for its content, depending of the typology of offerings. - Analyzes the interest and needs structures of its consumers. - Identifies the customer segment for commercial agreements. - Analyzes the problems and needs of customers to provide proposals that contribute to building its value offer. d) Products and services offer - Identifies the different benefits a media enterprise may attain. - Defines the services and products through which it seeks to reap the benefits. **3. To understand the elements that make up the operation** - Knows the different types of organizational structures according to the nature and purpose of the media enterprise. - Designs content production processes. - Understands content distribution channels/systems.

Component with practical relevance	Identify the conditions that determine media entrepreneurship arising for the context, the form they take to be acknowledged by the State and society as media, and the elements that shape their operational procedures

Topics and content units	**Context**
	- Society as the environment around the entrepreneurship.
	- Analysis of variables: society, culture, politics, technology and environment.
	- Market environment: demands and opportunities.
	- Opportunities and areas of activity within information enterprises.
	
	Form
	a) Regulation
	
	- Media legislation and right to information.
	- Enterprise creation: legal, administrative and financial considerations: commercial aspects.
	  · Company registration and commercial license renewal,
	  · Labor matters: contracts, fees and contributions, and
	  · Taxes and levies.
	b) Enterprise purpose
	
	 -Commercial activities.
	 -Legal standing.
	 -Organizational identity, purpose and mission.
	c) Market segmentation
	
	- Typology of audiences and customers.
	- Audience segmentation.
	- Target publics and audiences
	d) Products and services
	
	- Formal product and final product
	- Types of benefits
	- Portfolio creation
	
	Operation
	
	- Structures of information enterprises
	- Types of enterprise organization
	- Production systems
	- Distribution systems

On the issue of understanding the entrepreneurial ecosystem, the programs set out expected learning outcomes focused on finding out the motivations that lead people to begin entrepreneurial projects and define under which conditions they are able to do so, since all initiatives start from the context of coexistence with other enterprises (**Mauborgne**; **Chan**, 2004). The relevance of these LOs enables the students, based on the purpose of their entrepreneurship, to build a dialogue between themselves and the world: thinking about what to do from a personal dimension, identifying their values, mission, motivation, articulated with the needs of the wider world. This enables the identification of opportunities and threats in the environment and in the sector, but also the strengths and weaknesses of the project within the context in which decisions will have to be made constantly.

Table 6. Proposal of expected learning outcomes with practical relevance for the understanding of the dynamics of the entrepreneurial ecosystem

Component with practical relevance	Understanding the dynamics of the entrepreneurial ecosystem
Expected learning outcomes (LOs)	Reflects upon the opportunities of being an entrepreneur. Identifies the role of the entrepreneur as an agent of the ecosystem and how the latter influences upon their entrepreneurial purposes. Identifies the potentials in the creation of media enterprises. Identifies holistically the concepts of identity, culture, entrepreneurship and social responsibility. Determines the fundamental variables that differentiate business, entrepreneurship and enterprise strengthening. Identifies and analyzes the influence of different variables from the environment and the sector or industry.
Topics and content units	Find a purpose for the entrepreneurship, articulating passion, profession, vocation and mission. Analyzes the influence of actors of the surrounding environment upon the entrepreneurship effort. Recognizes the difference and traits of the red and blue oceans. Analyzes the sector or industry from the standpoint of current and potential competitors, products or services and suppliers. Understands entrepreneurship from the perspective of the Sustainable Development Goals, agenda 2030. Identifies the role of actors of the entrepreneurial environment.

Regarding entrepreneurial skills, there is unanimity around the capability of proposing and heading communication projects, processes and contents in different social, local and global, contexts, complemented by the development of critical thinking to interpret sociocultural processes and be able to perform in diverse fields of professional activity in public, private or mixed organization, or in charities, collectives or enterprises, in the media or in personal projects. To this end there is a need to strengthen skills along flexibility, adaptability, creativity and authenticity to compete and satisfy market needs (**Jooss** *et al.*, 2020).

Table 7. Proposal of expected learning outcomes with a practical relevance for the development of entrepreneurial skills

Component with practical relevance	Develop entrepreneurial skills
Expected learning outcomes	Critical analysis of the environment through observation skills. Strengthens teamwork capacity. Presents and argues projects and ideas.
Topics and content units	Creativity and ethics. Entrepreneurial identity and culture (entrepreneurial attitude: Entrepreneurial profile. Leadership and entrepreneurship. Entrepreneurship arising from cultural diversity). Soft skills (Disposition for service, and problem resolution; Leadership and teamwork; Entrepreneurial attitude and spirit).

The director and manager of media is a key role in the path of the entrepreneurship, because the director is the person in charge of planning, organizing and supervising the company (**Iborra** *et al.,* 2018). The LOs of the analyzed programs do not specifically state the development of media management skills, although they do present them in terms of project and product management. Although there is a trend for independent or freelance media and journalists to lead journalism projects and products to be sold to other media and organizations (*Propulsorio*, 2021), the project or product manager have a narrower margin in the media's decision-making processes. Thus, the director or general manager represents the leadership role in all the activities of the enterprise, laying out what should be done, how, with whom, when and with what (**Coulter** *et al.*, 2018) to reach the goals of the media as a business enterprise. It is the director who defines neatly the path of the entrepreneurial endeavor.

Table 8. Proposal for expected learning outcomes with practical relevance for the management of projects and media outlets

Componet with practical relevance	Media and journalism projects management
Expected learning outcomes	Understands the importance of *general management*. Knows the action options and the functions of a general director. Understands the importance of strategic planning. Develops strategic plans. Understands the differentiated roles of *project manager* and *product manager*.
Topics and content units	Concept and role of the general director. Characteristics of the general director. Direction tasks: planning, organization and supervision Directive roles: interpersonal, information management, decision-making. Relationship between plan and strategy. Strategic planning: analysis and definition. Strategic analysis: internal, external. Strategy construction: strategic statement, goals, structure, positioning, advantages, plan, models, organization, managerial tools, indicators and time frame. Differences between *project manager* and *product manager* Analysis of the consumer audience. Strategy of the communication product. Product communication: *performance*, *dashboard* and *backlog*. Sustainability of the communication product.

The instrument developed by **Osterwalder** and **Pigneur** (2016) is the most used in the programs analyzed. This canvas is clear and practical to develop an entrepreneurial business model. However, there is an improvement opportunity by integrating to the business model the two typologies of agents to which media are geared: consumer audience and client user (**Ventín-Sánchez**, 2004), since programs tend to include only the audiences in the market segment, value offer, distribution channels and in the relation forms. But, as enterprises have a multidimensional focus (**Osterwalder**; **Pigneur**, 2016), they should include these two agents (audience and clients) in all the elements that make up the business model canvas.

Table 9. Proposal of expected learning outcomes with practical relevance for the design of business models

Component with practical relevance	Design of business models for media enterprises
Expected learning outcomes	Defines a market segment to identify needs and problems to create a value offer for its intended target public and clients. Establishes the distribution channels through which the value offer reaches the target public and clients. Designs a communication focus and relationship with audience and clients. Establishes a system of revenue to ensure sustainability and profitability of the media outlet. Determines the intellectual and technological key resources to ensure the creation of a value offer and the operational capacity of the media outlet. Defines the key activities that ensure the strategic operation of the media outlet. Identifies partners to develop alliances that provide improvement opportunities in product development, distribution, commercial or other processes, to ease benefits. Identifies and collects the necessary expenditures to ensure the viability of the media outlet.

Component with practical relevance	Design of business models for media enterprises
Topics and content units	Identification of the market segment: target public and clients users. Value offer for the target public and client user. Distribution channels. Relationship with audience and clients. Funding. Human and technological resources. Key activities. Strategic alliances. Costs planning.

In the 17 universities courses are offered whose content promotes the development of business plans. However, there needs to be more depth when adopting techniques to generate products and services with a higher added value providing differentiation from competitors. The creation of value includes proactive discovery and adaptation (**Varun** *et al.*, 2018), which means that entrepreneurships must anticipate environment changes to remain competitive and sustainable.

Table 10. Proposal of expected learning outcomes with practical relevance for innovation and creation of products and services

Component with practical relevance	Innovation, prototyping and testing
Expected learning outcomes	Develops creative thinking processes. Differentiates between creativity, innovation and strategy. Applies creative problem solving methodologies. Produces innovative ideas and solutions in communication. Develops prototypes of low, moderate and high fidelity. Applies methods and techniques for testing and validation. Creates the brand identity and corporate philosophy. Validates the idea in academic and professional settings.
Topics and content units	Thinking and creativity. Relationship between creativity and innovation. Relationship between innovation and strategy. Multilevel perspective of innovation. Roles in creative teams for problem-solving. Creative problem solving. Design thinking: empathize, define, conceptualize, prototype, test and assess. Definition of minimum viable product. Customer development line: Product idea, validation and pivoting. Costumer creation and enterprise establishment. Design and launch of services and products.

The results highlight that, in general, the 17 institutions do not have a structured program that provides access to resources for the start-up of entrepreneurial student projects. It leads to the conclusion that there is also no program to attract investors interested in projects underway to push them to the acceleration phase. In this process, it is important to showcase the importance of digital social networks as the main resource to develop and obtain the required resources to accelerate growth in the initial stages of the entrepreneurship (**Mann**; **Harrison-Mirauer**; **Bassett**, 2020).

Table 11. Proposal of expected learning outcomes with practical relevance for acquisition of resources and entrepreneurship acceleration

Component with practical relevance	Acquisition of resources and acceleration
Expected learning outcomes	Identifies sources of funding. Builds strategies for the acceleration of the entrepreneurship. Creates a script for the business model.
Topics and content units	Preparation of commercial samples. Crowdfunding and collective projects. Business valuation and investment alternatives. Negotiation strategies. Negotiation with creativity.

The programs do not offer spaces and contents focused on growth and enterprise establishment. One of the reasons presented by Danny Barbery, dean of the *Faculty of Communication Sciences*, of the *Universidad Espíritu Santo* is that

"the development achieved by students through their entrepreneurship is prototyping",

so there are no mechanism for growth and establishment set in place. Although it is ideal for the programs to articulate their entrepreneurial and innovation units with all university programs (**Cuevas-Oviedo**, 2016), it is expected for the programs to provide tools, methods and techniques for growth and establishment that the students may apply when they become entrepreneurs.

There needs to be more depth when adopting techniques to generate products and services with a higher added value providing differentiation from competitors

Table 12. Proposal of expected learning outcomes with practical relevance for entrepreneurial growth and establishment

Component with practical relevance	Growth and establishment of entrepreneurships
Expected learning outcomes	Plans a communication strategy (from corporate identity to marketing and sales) both for the entrepreneurship and its respective portfolio. Builds and designs strategic communication plans according to the reality of the organizations.
Topics and content units	The business plan as an initial step in building a company. Marketing mix: product, price, promotion, place, persons, processes, perceptibles and productivity. Neuromarketing & neurosales. Customer loyalty strategies.

7. Conclusions

The analysis of 17 programs in social communication and/or journalism accredited by *Consejo Latinoamericano de Acreditación de la Educación en Periodismo y Comunicación* (*Claep*) has highlighted improvement opportunities on a series of aspects in the development of entrepreneurial skills.

> In general, the 17 institutions do not have a structured program that provides access to resources for the start-up of entrepreneurial student projects

First, there are those graduate profiles that mention they educate students in entrepreneurial competence but offer few courses in their study plans to address the required operative/conceptual aspects (**Ibáñez-Cubillas**; **Gijón-Puerta**, 2021). There is no agreement between their offer and their promise. In these cases, a curricular reform that establishes a clear education stream for entrepreneurial skills development should be created, as presented in the body of this article. The same recommendation is key for those programs that do not present these skills as part of their graduate profile and who do not offer the courses for them, because as it has been pointed out, the labor market for communicators and journalists has become difficult (**Gutiérrez-Coba**, 2020; **Gutiérrez-Atala** *et al.*, 2016), making entrepreneurship a viable option for graduates (**Sabés-Turmo**; **Verón-Lassa** 2012; **Casero**-**Ripollés**; **Cullell**-**March**, 2013; **Rafter**, 2016).

In other cases, the programs include various courses to the development of entrepreneurial skills, but do not state this strength on their graduate profile. The solution here would be to simply update the graduate profile.

On the other hand, it is fundamental for education institutions to create or strengthen entrepreneurship and innovation units that accompany students in their journey to mature their projects and make them become a reality (**Cuevas-Oviedo**, 2016). These units must work hand in hand with academic programs to comprehend the nature of the media entrepreneurships and respond adequately to the requirements of young entrepreneurs (**Pellegrini**; **Johnson-Sheehan**, 2021), because the journalism business has particularities derived from the social responsibility attached to information provision (**Martín**-**Serrano**, 2004).

The results of the research show that the analyzed institutions teach courses throughout their programs up until the creation of business plans. This process develops skills in each course, but there is no organized pathway to apply them consistently to the same project throughout the students' stay at university. Additionally, there is evidence for a need to strengthen the capacity of these business plans to become tangible via prototypes validated with the target market and experts to provide a more nuanced value offer and be able to access funds for the start-up and scale-up of the business (**Malecki**, 2018).

Most universities inform that they agree there is a need to foster and support an entrepreneurial spirit in their students to face the current professional circumstances in the field of social communication and journalism. As a principle they hold that, although not all students have to become entrepreneurs, they should all know about the businesses in the sector. To do so, they adopt methods that facilitate teaching entrepreneurship, as well as an assessment system focused on the process rather than the result.

Finally, the expected learning outcomes that enable process with practical relevance in innovative entrepreneurship can be classified alongside eight categories:

1) Identification of the conditions that determine the entrepreneurship from their context, based on the form they take to be acknowledge by the State and society as media and the elements that make up their operational structure;
2) understand the logics of the entrepreneurial ecosystems;
3) develop entrepreneurial skills;
4) manage media outlets and journalism projects;
5) design business models;
6) generate process of product innovation, prototyping and testing;
7) access resources to accelerate the entrepreneurship,
8) establish growth and establishment plans.

> Most universities inform that they agree there is a need to foster and support an entrepreneurial spirit in their students to face the current professional circumstances in the field of social communication and journalism. As a principle they hold that, although not all students have to become entrepreneurs, they should all know about the businesses in the sector

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Media labs: journalistic innovation, evolution and future according to experts

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Abstract

At the current crossroads at which both the media and journalism find themselves, innovation emerges not as a "nice to have" but as an absolute, urgent, and pressing necessity. In this context, labs are presented as a structured and –in a certain way– privileged space to do so. However, since there are also voices that are critical of these spaces, we ask to what extent they contribute to journalistic innovation and also what future these spaces may have. To find out, we conducted semistructured interviews with a nonprobabilistic sample of 18 experts in this field, because they are both associated with a lab and are qualified experts in journalistic innovation or they are academic researchers. The results show that labs can bring a media outlet both tangible and intangible benefits, ranging from increased audience, audience loyalty, and revenue to increased prestige and reputation. However, today their future is uncertain owing to a variety of factors, including the funding necessary but also the utopian nature of the idea that the DNA of innovation can permeate the entire media outlet when there is no space specifically dedicated to designing, generating, and disseminating it to the newsroom as a whole.

Keywords

Media labs; Innovation; Experimentation; New narratives; Journalism; Experts; Spain.

1. Introduction

> "The degree of disruption that the internet has brought to our information ecosystem is so total, so huge, so unknown in many ways –we can't expect anything other than a constant need to change."

This was recently expressed by Ros Atkins, a *BBC* journalist, who also pointed out that we live in an era of extreme creativity and that journalism should be able to keep pace with a broad view in the search for inspiration. Otherwise, he continued, we run the risk of audiences finding the news tiresome and limited compared with other products they consume. In this context, innovation consequently becomes something nonnegotiable –just like verifying data correctly, having good storytelling ideas, or being unbiased (**Atkins**, 2022).

Defined as

> "the ability to react to changes in products, processes and services through the use of creative skills that make it possible to identify and solve a problem or meet a need in a way that results in the introduction of something new that adds value to consumers and therefore increases the viability of the media organization" (**García-Avilés** *et al.*, 2019, pp. 3-4),

media innovation today is revealed as a

> "crucial asset for the survival of the media industry" (**Weiss**; **Domingo**, 2010, p. 1158)

to the point that, more than simply a task, it has become an essential mindset –perhaps the only possible one– to cope with a clearly disruptive information ecosystem.

In this regard, several authors have argued that, if traditional media want to remain relevant to their audiences in the new digital ecosystem, it is not enough for them to simply adapt; rather, they need to substantively reinvent themselves (**Westlund**; **Lewis**, 2014; **Küng**, 2015; **Paulussen**, 2016; **Fortunati**; **O'Sullivan**, 2019). Logically, **Porcu**, **Hermans** and **Broersma** continue (2020, p. 1420), this will not happen overnight but rather requires a new culture of innovative (**Porcu**, 2020) and resilient learning (**Seville**, 2017). In opposition to this, what is apparent to several researchers (**Ryfe**, 2012; **Buijs**, 2014; **Usher**, 2014; **Tameling**, 2015) is that newsroom culture has, to date, been more of an impediment –and not an impetus– to change and renewal. The desired innovative learning culture should embrace innovation in both its application and its exploration (**March**, 1991; **O'Reilly**; **Tushman**, 2013) and also all its elements, including –in the model of **García-Avilés** *et al.* (2019, pp. 11-13)– the areas and objectives of the innovation, the types of actors, the drivers, and the results, so as to minimize the impact of possible impediments at the same time.

Innovation is precisely the purpose for which the first media innovation labs were created two decades ago. According to their first definition, labs are

> "units or departments dedicated to the research, experimentation, development and implementation of technological and editorial innovations in their organizations" (**Salaverría**, 2015, p. 398).

According to **Tanaka** (2011), they tend to focus on new technologies to design, research, experiment, and innovate technologically and socially through the collaboration of various disciplines. In this sense, these are highly innovative internal management formulas that, in a number of instances, began as spaces for the creation of new narratives and, over time, have been transformed into product development laboratories. Other times, they have continued to be departments committed to the exploration and creation of interactive digital narratives, taking advantage of the possibilities generated by the evolution of the Internet itself.

At the same time, such labs are places of experimentation that have appeared as a strategic response to the current situation that many media outlets are dealing with today; they are experiencing a serious multifactorial crisis that urgently calls for new narratives, products, and services that meet the news needs of a consumer who has disconnected from the traditional media system and has opted to choose other ways of remaining informed.

In this context, it seems wise to have independent spaces in which to think, analyze, and test but –above all– have enough time and perspective to design different solutions, a necessity that is impossible to achieve in the frenetic pace of day-to-day operations. In this way, it is understandable that labs have been seen as a lifesaver for the media outlets in which they are integrated, due to their effective contribution in creating new narratives, new revenue streams, or even new audiences (**García-Avilés**, 2020; **Zaragoza-Fuster**; **García-Avilés**, 2020; **Zaragoza-Fuster**, 2022), something that also occurs in second-generation innovation labs.

The latter are those labs created between 2017 and 2021. Essentially, they differ from their predecessors in that they are more integrated into the organizational structures of the newsrooms, which allows them to more efficiently meet the needs of journalists who, in addition, work in specific phases of production (**Hogh-Janovsky**; **Meier**, 2021; **Zaragoza-Fuster**; **García-Avilés**, 2022; **García-Avilés**, 2023). Following these authors,

> ' Labs are highly innovative internal management formulas that, in a number of instances, began as spaces for the creation of new narratives and, over time, have been transformed into product development laboratories '

these labs 2.0 are also characterized by their employees' multiple efforts to act as a driver of innovation for the transformation of their organizations through knowledge transfer, the sharing of new ideas and approaches through advanced training, exhaustive and transparent communication of innovation, follow-up of agile projects, and staff rotation. In addition, these second-generation labs are more oriented toward the design of new, sustainable business models. To this end, they employ a process of constant learning and dynamic change. In more practical terms, **Cools**, **Van-Gorp**, and **Opgenhaffen** (2022) distinguish three types of working methods:

- static (where the lab team works alone),
- dynamic (where lab members collaborate with other professionals, such as the organization's journalists or engineers), and
- a method that is a hybrid of both types.

However, because there is no shortage of critical voices regarding the existence of innovation labs, we ask to what extent they contribute to journalistic innovation and what future they may have. This is the purpose of this article: to delve into experts' views on what is labs' main contribution to journalistic innovation and what can be expected from these spaces from this moment on, after some of the first ones have closed, thus giving certain signs of running out of steam, or at least in terms of their first formula (**García-Avilés**, 2020).

If today innovation is more important than ever as a strategic response to the multifactorial crisis affecting journalism and the media, and if labs are spaces specifically designed to encourage innovation, how is it that some of them have had such a short track record? What are the keys elements that guarantee their success? Specifically, in this text, we aim to answer the following two research questions:

RQ1. According to experts, what is such labs' main contribution to journalistic innovation?

RQ2. What future do they foresee for these spaces?

The results are presented below. First, we present a brief description of the hallmarks of these innovation units.

2. Labs as catalysts for journalistic innovation

According to some of the main contributions on the origin of media labs (**Salaverría**, 2015; **Donaire-Pitarch**, 2016; **Sádaba**; **Salaverría**, 2016; **González-Alba**, 2017; **Sixto**, 2019; **Zaragoza-Fuster**; **García-Avilés**, 2022), the first media lab was developed by the North American press group *Knight Ridder* in Boulder, Colorado. It was headed by Roger Fidler, who led a multidisciplinary team composed of journalists, designers, technologists, and researchers. His most prominent project was the newspaper tablet, a prototype predating today's tablets. In Spain, the lab created by *El Periódico de Catalunya*, led by Mario Santinoli, who wanted to develop a similar tablet, stands out. Starting in 2010, an international boom of these spaces began after leading media outlets such as *The New York Times*, *The Washington Post*, *The Boston Globe*, *the BBC*, *Agence France-Presse* (*AFP*), *The Huffington Post*, and *The Guardian* took a chance and began to lead their development.

In the United States, *The New York Times*'s lab, which was launched in 2006 and was later restructured into the Research & Development Lab, stands out. Serving similar functions, those at *PBS* and *The Boston Globe* seek to innovate from different perspectives that also include the creation of new journalistic projects and media literacy. Other labs have discontinued their activity. In 2015, *Buzzfeed*, for example, announced the launch of the *Open Lab for Journalism Technology and the Arts*; however, it closed two years later. During its run, they experimented with bots, drones, sensors, and spherical video, although in the end they realized that it was better to integrate the lab staff into the newsroom naturally rather than working independently. For some years now, the ongoing trend in the United States seems to be to incorporate innovation through development teams called "Research and Development" that experiment with the product and the business model.

In Latin America, innovation labs can be found in countries such as Argentina, Brazil, and Peru.

- In Argentina, *Nación Content Lab* was created in 2015 as a new marketing solution for brands interested in reaching their audiences through relevant, quality content.
- In Peru, *OJOLabs* –linked to the digital native *Ojo Público*– has created different interactive specials.
- In Brazil, the newspaper *Agência Pública*'s lab has experimented with different technologies and formats.

In Europe, Spain is one of the countries with the highest concentration of labs, including active ones as well as those that have been disappearing. It is followed by the United Kingdom, Germany, France, Norway, Portugal, Italy, Ireland, Switzerland, Finland, and the Netherlands. The first European media lab, *Medialab*, from the French news agency *France Press*,[1] began its operations in the first decade of the millennium. Among the European labs, we find those from prestigious media outlets, such as the *BBC News Lab* from the British public broadcaster the *BBC*, that of the French news agency *AFP*, that of *The Guardian*, or that of the Italian radio and television network *RAI*. However, some of them closed shortly after opening. Of the 28 European labs identified by **Zaragoza-Fuster** and **García-Avilés** (2022), 20 are still active. *RAI*'s lab, for example, closed a year after its creation, whereas others have been restructured and have been trying different approaches (**Nunes**, 2020; **Nunes**; **Mills**, 2021; **Mills**; **Wagemans**, 2021).

Despite the explosion in the number of labs in the 2010s –especially in 2012 and 2014– also due to a commercial boom, this has subsequently subsided, either because no new labs have appeared or because existing ones have been restructured or even disappeared. In fact, the phenomenon has not been immune in a way since, according to **Salaverría** (2015, p. 403), it seems more trendy to say that there is a lab than a conventional infographics and multimedia department. However, it is worth recalling, along with Küng, the importance of distinguishing between innovations based on business strategies and technological devices, which she calls "shiny new things." In this regard, Küng criticizes that many news organizations have abandoned long-term strategic planning in favor of short-term innovation projects that turn out to be merely tactical and opportunistic and consequently present a competitive weakness (**Küng**, 2017, p. 15).

The fact is that a comparative analysis of the different labs together with a review of the academic and professional literature on the subject offers up a series of similarities and differences. Among the former, labs are characterized by a strong commitment to innovation and a determination to extend innovation to the entire media outlet, being formed by small but multidisciplinary teams and having a certain degree of autonomy with respect to the newsroom and working

with agile methodologies, which allows them to inno-vate in a fast, economical, efficient, and dynamic way.

The strong commitment to innovation is, indeed, one of the central features of any lab, as well as its raison d'être (**Sádaba**; **Salaverría**, 2016, p. 158). This innovation extends to different areas, although the most common has to do with the development of digital narratives. At the same time, this commitment to innovation also becomes a chal-lenge, as it sometimes surpasses expectations and leads to a failure that the media outlet must shoulder. On the more positive side, media labs have managed to develop differ-ent narratives such as interactive infographics, scrollytell-ing, interactive documentaries, other interactive specials, newsgames, and immersive reports with 360° video, to name but a few of the most common types of nonfiction digital stories in recent years. Other times, innovation has included the discovery of new revenue streams or novel subscription systems.

> Labs are also places of experimentation that have appeared as a strategic response to the current situation that many media are dealing with today; they are experiencing a serious multifactorial crisis that urgently calls for new narratives, products, and services that meet the news needs of a consumer who has disconnected from the traditional media system

As part of a lab's commitment to innovation, it does not limit itself to generating it; rather, it seeks to disseminate it (**Rogers**, 2003) and extend it to the entire media outlet (**López-Hidalgo**; **Ufarte-Ruiz**, 2016, p. 11), albeit with varying levels of success (**Zaragoza-Fuster**; **García-Avilés**, 2020).

Ideally, their existence would become unnecessary because the entire editorial staff would organically take on the cul-ture of innovation. According to **Porcu** (2020) and **Valero-Pastor** (2020, p. 213), only those companies that foster a true learning culture among their members have the opportunity to:

- Innovate (**Cameron**; **Quinn**, 2011; **Heijboer**; **Korenhof**; **Pantjes**, 2013);
- Gain competitive advantages (**Porter**, 1985; **Watkins**, 1996; **Baars-Van-Moorsel**, 2003; **Yolles**, 2009);
- Transform themselves through the creation of new knowledge (**Nonaka**, 1994; **Wang**; **Su**; **Yang**, 2011; **Schenke**, 2015);
- Survive market disruptions over the long term (**March**, 1991; **O'Reilly**; **Tushman**, 2013).

At this point, the lab can be at the forefront of the aforementioned culture of innovative learning. According to Porcu, this is defined as:

> "a social climate that encourages people to work and learn together, to grow as individuals and as a group (team, organization), and that provides people with the autonomy to be flexible, to experiment, to be creative and to investigate radical possibilities so that the organization has a better chance of surviving in the long run. This is facilitated by servant leadership, open communication, mutual trust, a supportive culture, shared goals, valuing individual achievement, and training and development" (**Porcu**, 2020).

In practice, this culture can be transmitted in various ways. Following **Valero-Pastor** and **Carvajal-Prieto** (2019, p. 1160), the diffusion of innovation in a news organization includes teaching systems –formal, informal, and hybrid– and commu-nication systems –formal, informal, and hybrid– as well as professional resources such as employee exchange groups, interdepartmental visits, or ambassadors, who, as early adopters, act as "evangelists" of a particular innovation for the rest of the newsroom. On other occasions, knowledge transfer occurs through creative formulas such as the *El Confiden-cial Lab Day* (**Valero-Pastor**, 2020). Logically, technology can be a great ally for this purpose through the use of IT tools such as emails, newsletters, or services such as *Trello*, *Asana*, *Jira*, or *Slack* that dynamize, streamline, and simplify team collaboration by optimizing workflows (**Valero-Pastor**; **Carvajal-Prieto**; **García-Avilés**, 2019, pp. 8-9).

The labs are made up of small but multidisciplinary teams. The small size of these structures enables the generation of flexible and adaptive entities that are open to experimentation (**Palomo**; **Palau-Sampio**, 2016). In turn, multidisciplinary teams bring together journalists with other professionals such as graphic designers, video-makers, programmers, and IT developers with the idea of designing more contextualized and feature-rich journalistic products and services (**Küng**, 2015; 2017; **Zaragoza-Fuster**; **García-Avilés**, 2022).

In turn, these multidisciplinary teams enjoy a certain degree of autonomy, allowing them to accommodate two or even three working speeds. In this sense, labs have dynamics independent from the rest of the media outlet, which gives them greater flexibility to adapt to new market standards and create more attractive and complete products (**Vale-ro-Pastor**, 2020, pp. 234-235). According to **Mills** and **Wagemans** (2021, p. 11), this is also intended to ensure a certain distance from the hierarchical structures and routines of media organizations.

In addition, innovation labs are characterized by stimulating the flow of ideas and the development of collaborative proj-ects, with facilities physically configured to employ efficient and agile methodologies such as design thinking, problem solving (**Moultrie**; **Stevens**; **Crilly**, 2008), lean startup methodology (**Ries**, 2011), scrum methodology (**Maximini**, 2015; **Schwaber**; **Sutherland**, 2017), and *XP*, *Crystal*, *Kanvan*, or *Scrumban* programming, to name some of the most common (**Valero-Pastor**; **Carvajal-Prieto**; **García-Avilés**, 2019, pp. 4-8). In many cases, they start with the "minimum viable prod-ucts" with which they offer incremental value propositions to make them grow or to "pivot them" (in the jargon) and make whatever corrections are necessary.

On the other hand, labs are differentiated by the main focus of their activity and by their specialization in one type of interactive narrative or another. In the first instance, most first-generation labs were oriented, for example, toward exploring new narratives, formats, and data journalism and, to a lesser extent, toward technologically developing digital applications, promoting projects or startups, and making citizens literate in the critical consumption of media (**Salaverría**, 2015, p. 401).

As for the narratives in which they specialize, the most common are interactive infographics (**Vizoso**, 2020), scrollytelling (**Rojas-Torrijos**, 2014), podcasting (**Orrantia**, 2019), newsgames and gamified narratives (**García-Ortega**; **García-Avilés**, 2018), transmedia productions (**Scolari**, 2013), and interactive documentaries (**Vázquez-Herrero**; **González-Neira**; **Quintas-Froufe**, 2019; **Vázquez-Herrero**; **López-García**; **Gifreu-Castells**, 2019), which include video and are enriched with photo galleries, infographics, and scrollytelling to facilitate the assimilation of information and thus make it more didactic, dynamic, media rich, and entertaining. To a lesser extent, some labs have also explored the potential of drones and immersive reporting with 360° video (**Benítez-de-Gracia**; **Herrera Damas**, 2020). In Spain, the latter is the case of the labs at *El Confidencial* and, above all, *RTVE*.

3. Methodology

After this brief conceptual and contextual presentation of the labs, we will see what the experts' perception of the extent to which labs contribute to journalistic innovation is and what the future holds for these spaces. To find this out, between 2021 and 2022, we conducted semistructured interviews with a nonprobabilistic sample of experts with some of the most prominent voices in media innovation in general and in these labs in particular.

Indeed, following **Hernández-Sampieri**, **Fernández-Collado** and **Baptista-Lucio** (2010, p. 396), the types of samples that are usually used in qualitative research are nonprobabilistic or directed, whose purpose is not generalization in terms of probability. They are also understood to be "guided by one or a variety of purposes" because the choice of elements is dependent upon reasons related to the characteristics of the research. In turn, we opted for the semistructured interview modality (**Howitt**, 2019), as it ensured that the interviewees' responses covered the two central issues that we address in this article. In this case, we also opted for a sample of experts (**Hernández-Sampieri**; **Fernández-Collado**; **Baptista-Lucio**, 2010, p. 397), which requires the opinion of individuals with a qualified view on the subject. In turn, this view was contingent on the interviewee's own ties to a lab, in particular, on their status as experts in innovation in the media outlet, or on the fact that they are academic researchers. To conduct the interviews, we followed the usual procedure in these cases, systematized by authors such as **Young** (1960) and **Howitt** (2019). To provide a more complete view, we wanted to triangulate the academic and professional perspectives.

To select the candidates, we took into account some of the contributions they had made to the object of study, either from a theoretical point of view or from a professional perspective by being involved –at the time of the interview or at some previous time– in media innovation or in a particular lab. The following table provides a brief summary of each of them. To learn more about their careers, you can consult each of the links.

Table 1. List of experts interviewed

Name	Position	University/media outlet/lab	Role
Miriam Hernanz	Lab director[2]	*RTVE Lab*	Lab professional
Carol Espona	Journalist	*RTVE Lab*	Lab professional
César Peña Martínez	Journalist	*RTVE Lab*	Lab professional
Alejandro Laso	Director of Strategy and Innovation	*El Confidencial Lab*	Lab professional
Guiomar Del Ser	Editor-in-Chief of Editorial Product	*El País Lab*	Lab professional
Javier García Fernández	Journalist and lab manager	*Expansión Lab*	Lab professional
Àlex Badia	Co-founder	*Barret Films*	Expert in media innovation
José Antonio González Alba	Journalist	*SembraMedia*	Expert in media innovation
Alfredo Casares	Journalist	*Institute of Constructive Journalism*	Expert in media innovation
Michaëla Cancela	Audio editor	*Agence France-Presse*	Expert in media innovation
José-Alberto García-Avilés	Professor of Journalism	*Universidad Miguel Hernández*	Academic researcher
Miguel Carvajal-Prieto	Tenured professor	*Universidad Miguel Hernández*	Academic researcher
José-Manuel Noguera-Vivo	Tenured professor	*Universidad Católica San Antonio*	Academic researcher
Ainara Larrondo-Ureta	Tenured professor	*Universidad del País Vasco*	Academic researcher
Luis-Miguel Pedrero-Esteban	Professor	*Universidad Nebrija*	Academic researcher
José-Luis Rojas-Torrijos	Tenured professor	*Universidad de Sevilla*	Academic researcher
José-María Valero-Pastor	Professor	*Universidad Miguel Hernández*	Academic researcher
Teresa Zaragoza-Fuster	Journalist and teacher	*Universidad Miguel Hernández*	Academic researcher

In each case, we developed the interview guide from a series of common questions.[3] In line with the research questions we have outlined, the questions we posed to interviewees were:

RQ1. What would you say media labs contribute to journalistic innovation?

RQ2. What future do you foresee for innovation labs in Spain and in the world?

After conducting the interviews on the day and at the time preferred by each of the 18 interviewees, and with their permission, we proceeded to record and transcribe the content,[4] which we then organized and categorized. To analyze the results more efficiently, we found it very useful to work with the *Atlas.ti* software (version 22), examining the content first at a textual and then at a conceptual level, recognizing networks and connections between the views but also similarities, differences, and nuances between the different statements. The result of successive readings allowed us to ensure internal consistency and thus move forward with systematization. Finally, we proceeded to write up the results, which we now present. It should be noted that we had explicit permission from the sources to publish their statements without anonymity and also that the interviewees were given a period of time to refine the content of their statements in a fairly definitive version of the text.[5]

4. Results

4.1. Contributions to journalistic innovation

When asked how labs contribute to innovation, the answers were diverse but also complementary. For Zaragoza-Fuster, labs are the key to innovation in the media, as they offer both new working methods to newsrooms and new formats for audiences. For García-Avilés, a lab is innovative to the extent that it provides a "tangible or intangible benefit to the medial outlet". In turn, this benefit may take different forms: increased audience, increased loyalty, new revenues through new channels, and increased prestige of the media outlet by winning awards, recognition, distinctions, and, in short, any other form that may represent added value.

Similarly, one of the most common responses was to consider labs as privileged spaces for innovation and very useful systems for implementing it. Based on the premise that innovation consists of meeting needs and solving problems, through creative solutions, Carvajal-Prieto emphasized that the laboratory is a space that allows him to focus exclusively on it. But, he points out, he cannot work in a vacuum:

"(...) it is a *sine qua non* condition to have data so that the problems that they are solving are real and that these solutions are transferred; otherwise, it would not help innovation. It would be generating either isolated products that are not published or products about nothing, about rather experimental or theoretical problems" (Carvajal-Prieto, 2021).

Hernanz, for whom the loyalty gained from the reader, user, or viewer is "much, much greater" if it is based on the desire to meet a need, referred to the need for the lab to know the media outlet's audience very well and establish two-way communication with them:

"(...) the more we know our audience, the more we understand what they need, the better we will do our job, and therefore it is very necessary to have an open communication channel with them because, as they are also sources, they will tell us things, they will put us on track and, in turn, then we can do our journalistic practice of verifying, making our calls, etc." (Hernanz, 2021).

Regarding the working method provided by the lab, Noguera-Vivo believed that traditional media outlets were guilty of having a somewhat haughty and hierarchical view about telling the audience what they needed to know, while current forms of entrepreneurship are more humble, trying to find out what their needs are first. In this sense, labs offer a method to more efficiently concretize the view of journalism as a service, since innovation is something that arises as a result of a method, to make the digital media outlets' design seem more reliable and to make a product that focuses preferentially on the user:

"(...) traditionally, journalists have been very romantic and have thought that their profession was only about generating content, but now that the media scene has become so complex and we have seen that you have to do something more so that your good content reaches the audience, I think that media labs have also given that intuition, that nose for news, a method, a methodology, because innovation is not something that you come up with because you woke up inspired one morning" (Noguera-Vivo, 2021).

In addition, the idea of the lab as a space in which the different roles can be positioned has also emerged:

"It was necessary to create a place for these roles, and surely the media lab was the most suitable place" (Noguera-Vivo, 2021).

The lab is also referred to as a space in which decisions are made. This was the opinion of Pedrero-Esteban, for whom this type of department is, in a certain way, the spearhead of the media, as it opens paths that can then be followed by the other members of the newsroom and the organization, since innovations are not only limited to the final result but can also be related to modifying the organization of work, processes, distribution, monetization, metrics, etc. In this sense, Pedrero continues, the labs provide the ability to work with perspective and to imagine as yet unknown ways of doing things.

To make decisions from this wider perspective, the respite made possible by the lab is essential. Without it, Hernanz pointed out that it seems very

> "difficult to find innovation; it is very difficult to really leave behind what you already know how to do because the inertia is to do what you already know, shake it off, and move on to something else" (Hernanz, 2021).

In a similar sense, Casares thought that the lab provides a space and a place where you can ask yourself different questions, experiment, analyze what others do, analyze what you do yourself, and above all, try things out. "And when you try something out and, in addition, include diverse roles, certain things start to happen". In this way, he continued, the lab has emerged as a strategic response to a very real need that the media are experiencing today: "of providing value in a society that is rapidly changing" (Casares, 2021).

For Rojas-Torrijos, labs act as a testing ground, like a radar that scans everything that is happening in terms of journalistic innovation, inside and outside of the country:

> "It usually has a team of people who are dedicated to studying, thinking, and creating, something so valuable and important in a time when, in the media, everything is done too quickly. In addition, its structure, which usually brings together professionals from different fields and roles, such as editors, designers, and programmers, shows that the future of journalism also lies there: by adopting integrative and cross-cutting work formulas because, with this perspective, new stories can be offered to audiences, trying out new angles and supported by new ways of telling what is going on and what is of interest to people" (Rojas-Torrijos, 2021).

In Del Ser's opinion, labs are above all catalysts for innovation and a change of approach, by modifying the way a journalistic assignment is tackled and thus forcing colleagues to think differently. To Peña Martínez, labs catalyze innovation in those media outlets that decide to equip themselves with them. In this sense, he understands that part of his job is to push editors with more ingrained habits and ways of doing things out of their comfort zone and motivate them so that they are able to overcome their resistance (Peña Martínez, 2021).

For Larrondo-Ureta, labs can contribute to innovation in many ways since innovation is a multidimensional concept that encompasses technological, procedural, and technical aspects related to software, apps, and platforms, but it also includes innovation related to topics, coverage, approaches, formats, genres, and narratives.

From a more applied perspective, Laso illustrated the ways in which *El Confidencial*'s lab has been a catalyst for its newsroom, but also –on other occasions– even for other media outlets that have "jumped on" the bandwagon by showing a path that they had not explored but which they also want to join. And in this sense, he mentions innovations such as the automated writing of news related to sports, weather, lottery, and issues "that are easy to write on". In his opinion, another advantage of this type of automation is that it frees professionals up to dedicate themselves to doing more journalistic work, which is more complex and requires more "gray matter" (Laso, 2021).

For Cancela, labs' contributions to innovation are numerous because they are also the very areas in which innovation can take place through multidisciplinary teams that have the time, resources, curiosity, and desire to explore, research, and create. She mentioned, for example, how to use ultra-localized data journalism, virtual reality, artificial intelligence, and facial recognition technologies that are already being applied in many other fields, including policing, entertainment, and language studies:

> "In our field, it is rare that there are real innovations, but there are new applications of technologies that are here and we have to think about what applications we can use them for. Nobody is going to do it because we are the ones who know the needs of our users and our own needs" (Cancela, 2021).

According to González Alba, labs add to the culture itself and to the essence of what it means to innovate by implementing new solutions:

> "That's what innovation is all about: trying to achieve the same objectives we have as a company, but doing things differently because what we had is no longer working for us. This focus now on readers, this experimentation with our users' data when it comes to offering them content –not only that they demand, but that they need– is the essence of the innovative culture within the media. And a very efficient way to implement this is through these media labs" (González Alba, 2021).

For Valero-Pastor, labs' contribution to innovation is highly dependent on the media outlet. *El Confidencial*, for example, does have everything and is a driver of innovation, although he also looks favorably upon those media outlets that do not have a lab as such but have decided to spread innovation throughout different departments and units:

> "(...) I believe that it is not necessary to have an innovation lab to innovate in media outlets. This innovation can simply be distributed across several departments and units and it's not necessarily required to create a department as such to innovate" (Valero-Pastor, 2021).

> The labs offer tangible and intangible benefits for the media outlet, new working methods for newsrooms, and new formats for audiences

4.2. The future of labs

When asked about the future of labs, the interviewees reflected a wide variety of views –including those who believed that there will be fewer, that there will be more, or that their future depends on various factors, and those who answered that they do not know what the future holds for them. In the first group, there were those who believed that, in the future, labs will be dispersed into new professional figures within the newsroom. This is what Carvajal-Prieto, for example, believed; for him, the future will involve creating figures and roles more specialized in the tasks that used to be solved by labs: the head of product, head of visualization, chief data officer, audience manager, etc.

Similarly, for Noguera-Vivo, the desirable end point would not be to fall victim to their own success but rather to have achieved their objective and, once the culture is in place, to relocate roles and continue working in the same line. Even so, he thought that we are still far from that ideal point at which a media outlet could say that it did not need a lab because it already has a culture of innovation that permeates the entire institution.

For Laso, labs make sense as they have been created: "the thing is that they have to evolve" because, if the innovation unit is entrusted only to one group of people, it wastes the potential for the entire workforce to have that mentality. And, in this sense, he believed that the international trend will be to no longer be units called labs and to end up integrating into other units that, in turn, are infused with all the energy and take on the way of working that was carried out in the lab (Laso, 2021).

While recognizing the value of this vision, Casares also considered it to be idyllic and utopian:

> "What happens is that this is not normally the case. The newsroom has a very specific, fundamental, priority mission, which is to create content to fill a website, to produce a newspaper every day, to produce a radio or television bulletin, every day. And this activity consumes a lot of energy (...). The day-to-day tends to take up a percentage of people's time that is usually close to 100% with the result that the space for innovation and creation disappears" (Casares, 2021).

If a newsroom is capable of integrating that spirit and sustain it, "fantastic", Casares continued. Otherwise, "I think everyone has to see to what degree they have to sustain or incorporate it". In a very similar vein, Valero-Pastor stated that there needs to be someone thinking about the future in terms of both products and business models, and not just content or short-term products. And that "someone" can be integrated into a lab or into the rest of the editorial staff, but it is necessary for them to exist.

Similarly, González Alba believed that, to the extent that the different technological possibilities and tools allow the profession to improve, experimentation and a commitment to innovation will continue to be necessary "whether or not it is through a lab". And, as examples of these new trends, he mentioned virtual reality and artificial intelligence. For Del Ser, as well, it is necessary to prioritize this type of work by giving it its own unit. Far from seeing labs as "a luxury that can be dispensed with in times of need", it would be advisable for companies to make the effort to preserve that small cell in which they can think better and differently so that they can then spread this to structures and workflows (Del Ser, 2021).

In a similar vein, García Fernández (2022) recognized that, even if innovation labs evolve into something else or diffuse into other forms such as "storytelling, data or whatever department", they must exist in any case as part of the responsibility to the media outlet, to innovation, and, ultimately, to journalism.

According to González Alba (2021), even once the digital transformation of newsrooms has been definitively achieved, it will be necessary to stick to their commitment to this constant evolution, which can only be designed with a successful strategy of innovation and adaptation to change.

Valero-Pastor is not very certain about the future of labs because, in the United States, for example, there is no major media outlet that has them. From his perspective, it is possible that media labs will become product teams, following the trend of *El Confidencial*, whose new narratives lab transformed into a product and business model lab (Valero-Pastor, 2021).

In any case, even if they were to disappear as such, in the end, success would be that their spirit would permeate all levels of the newsroom, but especially the product team (or "research and development" as it is called in the United States), which is in charge of shaping the future:

> "really its spirit or its third-gear dedication would be infused into the product teams and, secondly, within the teams of new narratives, data journalism or machine learning; those types of departments that are more advanced in terms of format" (Valero-Pastor, 2021).

In a similar sense, Pedrero-Esteban pointed out that any big change begins with a small change that is cemented as the rest of the media outlet, structures, departments, and people see that it can be good:

> "this in ambiguous and abstract terms may not be an answer that applies to everyone, but I do believe in that this is the essence of it" (Pedrero-Esteban, 2021).

For Peña Martínez, from *RTVE*, labs do not have a good future because it is very difficult for managers to understand the benefits of having people "testing and testing and sometimes with no success". In his opinion, labs will go extinct, but

the work in newsrooms will be much more multidisciplinary, since more and more data analysts and computer scientists are needed to meet demands that are different from those of the rest of the workforce (Peña Martínez, 2021).

On the contrary, Zaragoza-Fuster believed that it is possible that the labs will go further. In this sense, he asserted that, despite not investing in the creation of labs, the media in Spain are investing in innovation: "little by little, they will realize that they need them and will incorporate them. Many work with data units, which are similar". From an international perspective, Zaragoza-Fuster believed that large media companies already have them, especially in the case of public media. In his opinion, it is therefore possible that they will proliferate as a strategy for competing when it comes to innovation. In similar terms, Espona, from *RTVE*, did not see a future without labs, while emphasizing the desirability of playing with technology while offering quality and journalistic information at the same time (Espona, 2021).

> Another group of interviewees believes that the future of labs depends on several factors, for example, on the media managers' vision and their ability to ascertain that it is a commitment that requires patience before they'll start seeing the fruits of their labor, and therefore, it cannot be short term (Rojas-Torrijos, 2021). In this regard, the author acknowledged the efforts of *RTVE*, *El País*, and groups such as *Unidad Editorial*, which has just created the *Expansión*LAB, as this shows that they seem to understand that innovation is the path to differentiation at a time when this is key in attracting highly fragmented audiences.

For Larrondo-Ureta, the future of labs also depends largely on how much or how little technology is implemented because

> "we are seeing that technology is once again emerging as a major factor owing to the advancement of artificial intelligence or immersive visualization techniques" (Larrondo-Ureta, 2021).

For other experts, their future greatly depends on the type of media outlet in each case. In Noguera-Vivo's opinion, in the case of young digital native media, for example, since they start out small, they already come with a generation of highly trained journalists, so that each of them is, in a way, "a small lab in itself", and therefore, they do not need to have a lab. In contrast, the big media outlets, those that come from print and the pre-internet era, have had to deal with budget cuts, the generational clash, the digital transition, and the technological transformation, and

> "obviously, those need a lab, they are using it and I think there is still a long way to go for the lab in many ways" (Noguera-Vivo, 2021).

The former director of the lab of the *Diario de Navarra* expressed a similar opinion:

> "My feeling is that innovation spaces are very relevant, especially in very traditional media. There are independent media, much smaller, many of them niche, which already have or are created with very agile DNA, very innovative, mainly in the digital field. For them it may be simpler. For the more traditional media, those with larger newsrooms, newsrooms that have a longer history with professionals with a certain degree of seniority, with practices closely related to the product, with print in many cases, with the history they bring, I think it will continue to be very important to have spaces where they can almost experiment with the start-up model and launch small or larger initiatives and transfer them" (Casares, 2021).

At this point, he cited *RTVE* and *El País* as good examples of large and prestigious media outlets that have to combine the demands of daily operations with the need to improve the quality of their journalism in terms of storytelling, technology, content, etc., and for this, they need constant testing. In these cases, Casares continued, "I have the feeling that they will continue to play an important role".

Finally, there are also interviewees who said that they do not know what the future holds for labs:

> "Well, this is a question I can't really answer because I have no idea if labs are going to be something that will still be around in a few years or if they're going to be something that will gradually come to an end. I like what he said, when I interviewed Alejandro Laso (...), he usually says that he would like for, in a few years, his media outlet's lab to disappear because it would no longer be necessary, because innovation would be in the DNA of all journalists, of all media professionals. I like to think that would be ideal, right? In a perfect world, media outlets could transmit, developing innovation at all levels and therefore the specific units, the labs would not be necessary because the DNA of innovation would be everywhere" (García-Avilés, 2021).

The professor of Journalism recognizes that this is utopian, but it's also a goal. To move toward it –he continued– it seems essential to work on the transfer of knowledge of the results of innovation to the media outlet as a whole.

In Cancela's opinion, it is difficult to predict the future of these spaces because, in times of crisis –such as the one currently facing both the media and journalism– their budget is the first to be cut:

> "Well, it's difficult, I don't see why they would cease to exist because they are necessary. There must be a space where the different disciplines can interact to continue advancing. So, it seems to me that they are necessary, but it is true that I would not risk making a prognosis because when you are in the media the first thing that gets cut are these types of spaces that do not produce money in the short term" (Cancela, 2021).

In this vein, Cancela stated that maintaining a lab is very difficult for the media because both the economy and politics "and many other things" are designed "only for the short term".

5. Discussion and conclusions

Labs are highly innovative internal management approaches that, in several cases, began as spaces for the creation of new narratives and, over time, have been transformed into product development laboratories. Other times, they have remained departments committed to the exploration and creation of interactive digital narratives, taking advantage of the possibilities generated by the evolution of the Internet itself.

At the same time, labs are places of experimentation that have appeared as a strategic response to the current situation that many media are dealing with today; they are experiencing a serious multifactorial crisis that urgently calls for new narratives, products, and services that meet the news needs of a consumer who has disconnected from the traditional media system and has opted to choose other ways of remaining informed.

In this context, it seems wise to have independent spaces in which to think, analyze, and test but –above all– in which to have enough time and perspective to design different solutions, a necessity that is impossible to achieve in the frenetic pace of day-to-day operations.

With respect to how labs contribute to innovation, the experts' answers were diverse but also complementary. It is noteworthy that they offer both new working methods to newsrooms and new formats for audiences, as well as tangible and intangible benefits for the media outlet. Tangible benefits include audience growth, increased loyalty, and the generation of new revenues through new channels. In terms of intangible benefits, the lab can increase the prestige and reputation of the media outlet by receiving awards, recognition, and distinctions.

Another contribution of the labs is that they are privileged spaces for innovation, understanding that this involves meeting needs and solving problems through creative solutions. By dedicating themselves exclusively to this, labs are also understood as a strategic response to a very real need experienced by the media today. Logically, this is subject to certain conditions, such as having data to ensure that the problems being solved are real and that these solutions are transferred. It is also convenient to have a very open communication channel with the audience because, the more you understand their needs, the better the lab's work will be. Innovation labs also offer a method to concretize the vision of journalism as a service, while at the same time, they are spaces in which to position a variety of roles, ask different questions, experiment, analyze what other media outlets do, analyze what the media outlet itself does, test, and end up making decisions.

These are very varied, and –since innovation is a multidimensional concept– they can affect distribution; monetization; metrics; technological, procedural, and technical issues related to software; applications; and platforms. Decisions made in the lab may also involve innovations in topics, coverage, approaches, formats, genres, narratives, task organization, and workflows.

As there are also several areas for innovation, decisions may also affect how to use ultra-localized data journalism or how to apply virtual reality, artificial intelligence, or facial recognition. For all this, the respite made possible by the lab is indispensable because the inertia is to do what is already known to "get it over with and move on".

In this sense, the results support the thesis that the organizational design for the production of daily products results in a "natural" orientation towards short-term exploitation that ends up engulfing the exploratory innovation referred to above. According to, for example, Porcu, Hermans and Broersma:

> "This lack of exploration does not come as a surprise, as newsrooms focus on the production of news on a daily basis. Hence, the organisational design for the output of daily products results in a 'natural' focus on the exploitative short term. But if left unbalanced by long term oriented exploration, the efficient and exploitative turns of the newsroom hamster wheel typically absorb most of people's creative energies, leaving nothing for explorative innovation" (**Porcu**; **Hermans**; **Broersma** , 2022).

However, the future of labs is uncertain. Respondents' answers were grouped among those who believe that there will be fewer, that there will be more, or that it depends on various factors, and those who directly stated that they do not know. The first group included experts who believed that, in the future, labs will be dispersed into new professional figures such as the head of product, head of visualization, chief data officer, audience manager, etc. We also place in this group those professionals who believed that, although the labs respond to a need in a space and time, the ideal is that they evolve in such a way that no one on the staff is robbed of having the same mentality as that which inspired the creation of the lab. We also include here those who believe that this is an idyllic vision that, in fact, does not correspond to what happens in practice, since newsrooms are excessively busy with day-to-day operations, something that –again in line with the approach of **Porcu**, **Hermans** and **Broersma** (2022)– takes too much energy.

> Innovation generated in the lab can affect organization, distribution, monetization, metrics, technological issues, and innovation in topics, coverage, approaches, formats, genres, and narratives

Another group of interviewees considered it possible that the existence of labs will "snowball" as media outlets realize that they need them and incorporate them as a differential strategy in the face of competition, and also in the face of the true fact –as the literature indicates– that exploratory innovation in traditional newsrooms is scarce and, therefore, very necessary (**O'Reilly**; **Tushman**, 2004; **Storsul**; **Krumsvik**, 2013; **Westlund**; **Lewis**, 2014; **Küng**, 2015; **Tameling**, 2015; **Fortunati**; **O'Sullivan**, 2019; **Porcu**, 2020) since, without exploration, the organization does not welcome or develop creative or new ideas. This can result in risk-averse organizations that are "trapped in suboptimal stable equilibria" (**March**, 1991, p. 71).

> The future of the labs is uncertain: on the one hand, the idea that the DNA of innovation can permeate the entire media outlet when there is no space specifically dedicated to designing, generating, and disseminating it seems utopian, but on the other hand, labs require specific funding whose return is not guaranteed, at least not in the short term

For a third group of interviewees, the future of labs depended on several factors. For example, the heads' vision, the greater or lesser level of technological implementation, and the type of media outlet being evaluated in each case. Since young digital-native media start out small, they already come with a generation of journalists with a high degree of digital training and culture, such that each one of them is, in a way, "a small lab". In contrast, the traditional media, which come from print, need a space in which to experiment to put in place and test different initiatives.

Finally, a fourth group of interviewees directly stated that they did not know what the future holds for labs, because this idea that the DNA of innovation can permeate the entire media outlet is, de facto, very complicated and somewhat utopian. In this sense, some of the interviewees agreed with the statement that news organizations are not very good at achieving exploratory innovation (**O'Reilly**; **Tushman**, 2004; **Storsul**; **Krumsvik**, 2013; **Tameling**, 2015; **Westlund**; **Lewis**, 2014), since daily news production, focused on short-term demand and efficient production, usually takes up most of people's creative energy (**Porcu**; **Hermans**; **Broersma**, 2020, p. 1423). However, as **March** (1991) and **O'Reilly** and **Tushman** (2013) point out, if organizations seek long-term survival, at least both types of innovation are needed.

On other occasions, doubts about their sustainability come from the –relatively common– practice of cutting the budget available to these units in times of crisis, such as the one we are experiencing today. Understandably, this danger seriously compromises the privileged space that labs offer to promote exploratory innovation, which, in a necessary "organizational ambidexterity" (**Maijanen**; **Virta**, 2017), is essential to ensure the survival of an institution, especially since, according to **Porcu**, **Hermans** and **Broersma** (2022), the focus on application seems attractive in the short term but may become "self-destructive" in the long run.

Moreover, the responses of the interviewees confirm that, despite the fact that the media labs of Spanish media outlets have been around for more than a decade, their configuration –that of those that survive– is elastic and, in many aspects, is still a work in progress. In any case, the superiority –and greater sustainability– of second-generation labs (**Hogh-Janovsky**; **Meier**, 2021) compared with first-generation labs is also noted.

The main limitation of our study is that it only focuses on the views of some of the most prominent experts in innovation labs in Spain. Although the results offer a view of interest in systematizing the discourse of qualified voices related to the object of study, the results cannot be generalized. Moreover, it comes in an unusually complex context, marked by the worldwide impact of the Covid-19 crisis, which, understandably, has not helped with the progressive consolidation of these areas.

As future lines of research, it would be interesting to broaden the focus to include the views of other experts in the Spanish field, such as those linked to the labs of the aforementioned media outlets in Peru and Argentina and, moreover, to also include the perspectives of the heads of some of the labs with the greatest activity in Europe and the United States to continue exploring to what extent they apply agile methodologies but also what difficulties they experience and what strategies have been most efficient in overcoming them. It would also be interesting to examine in depth why they decided to close those labs that have not continued their activity and to explore how to reverse these possible causes. With the goal of continuing to build knowledge, it could also be useful to continue working on the conceptualization of the interactive narratives generated in the labs and to examine the audience's preferences to foster an exploratory innovation that is capable of designing products and services that are better suited to their needs.

6. Notes

1. It is still active today. To learn more about the projects they are working on, you can check out their website at *https://www.afp.com/en/agency/medialab*

2. At the time we conducted the interview. Since December 2021, she has been Director of New Narratives and Audiovisual Formats at *Prisa Media*

3. For reasons of space, we include here the answers related to the object of study in this article. This article is part of Camilo Satizábal Idárraga's doctoral thesis entitled "Labs of media outlets as catalysts of journalistic innovation: concept,

situation in Spain, and view, of experts", defended in September 2022 at *Universidad Carlos III de Madrid* under the direction of Professor Susana Herrera-Damas.

4. Owing to the difficulties of carrying them out in person, we carried them out remotely in synchronous online mode through *Google Meet* or the platform preferred by the interviewee, who, in this case, sent the corresponding link.

5. In any case, all of them were quite satisfied with the version we sent them, with few adjustments in purely formal and expressive matters.

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The science of team science (SciTS): An emerging and evolving field of interdisciplinary collaboration

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Abstract

In recent years, collaboration within a team to solve complicated scientific and social problems has attracted growing popularity. In particular, many complex challenges and opportunities require expertise and skills across disciplinary, organizational, and cultural boundaries. However, rapid growth in the demand for scientific collaboration has outpaced changes in the factors needed to support scientific teams. Also, scientific results are not simply a combination of different working results; understanding how teams work and what causes them to fail or succeed is of the utmost importance. Thus, the Science of Team Science (SciTS), an emerging interdisciplinary research area, has emerged as a way of understanding and managing the circumstances that facilitate or hinder the effectiveness of large-scale cross-disciplinary, collaborative research, training, and translational initiatives. SciTS integrates various quantitative and qualitative research methods and is still advancing in its sophistication. Using bibliometric and information visualization methods, this paper clarifies the concepts and connotations of teams and team science. It sets out important events in the emergence and development of SciTS and summarizes the characteristics of the SciTS literature, identifying seven main research areas. The paper concludes with a discussion on the challenges facing the future advancement of SciTS and corresponding recommendations for breaking through these bottlenecks. Our goal is to deepen researchers' understanding of SciTS and better inform the policies and practices that govern SciTS for more effective team science.

Keywords

SciTS; Team science; Science of Team Science; Scientific problems; Research teams; Interdisciplinary collaboration; Trends; Evolution; Recommendations; Review article.

1. Introduction

Scientific research is trending toward greater interdisciplinarity (**Van-Noorden**, 2015) and collaboration (**Wuchty** *et al.*, 2007) as a way of meeting the challenges that confront contemporary society (**Soranno**; **Schimel**, 2014). Compared to the past, scientific problems today are more complex and more unstable –especially problems that affect the fate of all humanity, such as public health, the environment, politics, and policy challenges. Solving these problems requires more than just a simple combination of disciplines. Rather, they need an integrated, interdisciplinary team that can coordinate their efforts in a way that blends knowledge from multiple fields (**Fiore**, 2008). As mentioned in the literature, we are not students of some subject matter but students of problems (**Popper**, 2014). Consequently, "problem-driven" practice is gradually becoming the dominant approach to scientific research, and may cut right across the boundaries of any subject matter or discipline (**Limoges** *et al.*, 1994). It has been shown that efforts to foster greater collaboration among scientists trained in different disciplines are helpful and essential for improving social, environmental, and public health issues (**Hiatt**; **Breen**, 2008).

Interdisciplinary collaboration is essential for scientific discovery and scientific translation (**Bennett**; **Gadlin**, 2012). Some institutions have even established "interdisciplinary research awards" to encourage teamwork and interdisciplinary collaboration. For example, the *NIH's National Center for Research Resources* funds the *Clinical and Translational Science Awards* (*CTSAs*) to bring together researchers from diverse research fields so as to translate scientific discoveries into clinical treatments (**Börner** *et al.*, 2010). Similarly, the *Swiss Academies of Arts and Sciences* has established the *Swiss-Academies Award for Transdisciplinary Research* to reward outstanding contributions to transdisciplinary research (*Swiss Academies of Arts and Sciences*, 2022).

Teamwork and interdisciplinary collaboration can achieve scientific breakthroughs that are not traditionally possible in a single discipline. However, this kind of collaboration can also present many unprecedented challenges. Large team sizes, great diversity among the membership, high task interdependence, deep knowledge integration, permeable boundaries, and geographic dispersion are just a few of the difficulties that need to be overcome. Previously, these problems have been solved by inviting scientific leaders to discuss specific solutions. However, the anecdotal evidence generated by such conversations lacks generalizability and can lead to misleading directions that hinder progress (**Hall** *et al.*, 2018). Consequently, the Science of Team Science (SciTS), an interdisciplinary research area, has emerged, which uses experimental research methods to study how scientific teams are organized, how they communicate, and how they conduct research to provide evidence-based solutions for team collaboration.

Since the 21st century, the dramatic growth of publications in the SciTS field indicates that more and more scholars are interested in team science. However, some critical concepts of SciTS are still vague, and the overall development chain of SciTS has never been systematically reviewed. Therefore, in this paper, we use bibliometrics and information visualization methods to clarify the relevant connotations of team science and provide a systematic review of SciTS in terms of its emergence, development, and research progress. Our goal is to deepen researchers' understanding of team science and promote the further development of SciTS.

2. Relevant connotations of SciTS

2.1. Team

The concept of a team has a long history and has been defined by many scholars from several perspectives, with Stephen P. Robbins proposing the more popular view that a team is a formal group of individuals who depend on each other to achieve a goal (**Robbins**, 2004). This definition highlights the difference between a "team" and a "group", meaning that all teams are groups, but only formal groups can be teams. Other scholars have added to this concept. For example, Gary Hamel argued that team members are complementary and interdependent because they take on specific tasks and share responsibility for achieving team goals (**Hamel**, 2008).

In terms of types of teams, Rey-Rocha *et al.* define "team" from two perspectives. From the input perspective, teams are formed based on existing administrative arrangements, e.g., where colleagues belong to the same administrative unit (**Rey-Rocha** *et al.*, 2006). These are referred to as traditional teams. However, some researchers suggest removing the reference to administrative units from the definition of a team because if this constraint stays in place, many interdisciplinary teams would be excluded (**Liu** *et al.*, 2020). From the output perspective, teams are formed based on collaborative relationships, e.g., where coauthors work together on an article. These teams are referred to as virtual teams. Teams based on co-authorship have the advantage of verifiability, data availability, and ease of measurement. Hence, this is the most common way to study scientific collaboration. In addition, there is another type of team called a temporary team. These types of teams are formed at the start of a project and dissolved once the work is complete (**Goodman**; **Goodman**, 1976). By definition, a temporary team is a group of workers who are temporarily organized to work together in order to complete a complex task. Usually, the task is short-term.

> The Science of Team Science (SciTS) is a new field of interdisciplinary collaboration that uses experimental research methods to study how scientific teams are organized, communicate, and conduct to provide evidence-based solutions for team collaboration

Based on these existing concepts, we consider a team to be a formal group of individuals who complement their talents and depend on each other to achieve common goals, meet certain standards, and/or carry out responsibilities. There are three types of teams: traditional teams, virtual teams, and temporary teams.

2.2. Cross-disciplinary team

In the field of SciTS, teams are often created to solve complex, large-scale societal and environmental challenges (**Read** *et al.*, 2016), such as climate change, nuclear power safety, and bioengineering. Finding solutions to these 'wicked' problems requires research collaborations across disciplinary, organizational, and geographic boundaries (**Hall** *et al.*, 2018). Thus, "teams" in SciTS are generally cross-disciplinary, striving to integrate concepts, methods, and theories drawn from two or more fields to solve complex problems (**Falk-Krzesinski** *et al.*, 2011; **Stokols**; **Hall** *et al.*, 2008). Rosenfield conceptualizes four main types of cross-disciplinary collaboration teams, which depend on the complexity of the problem: unidisciplinary teams, multidisciplinary teams, interdisciplinary teams, and transdisciplinary teams.

In unidisciplinary teams, researchers from a single discipline try to solve a research problem jointly.

In multidisciplinary teams, researchers have a common research problem, but researchers from different disciplines work independently and usually only combine their results at the end. This type of research is not typically pathbreaking, but it reveals different aspects of a given problem and can lead to immediate, albeit possibly short-lived, solutions.

In interdisciplinary teams, researchers interact and work jointly to address a common research problem. Their research design combines concepts and methods from each of their respective fields. Knowledge from different disciplines is blended with each other to discover and draw meaningful conclusions.

In transdisciplinary teams, researchers work jointly to develop and use a shared conceptual framework that integrates and extends discipline-specific theories, concepts, and methods to create new models and approaches to addressing a common research problem.

Table 1 summarizes the definitions and distinctions between unidisciplinary, multidisciplinary, interdisciplinary, and transdisciplinary teams.

Table 1. Four types of cross-disciplinary teams

Categories	Definition	Examples
Unidisciplinary teams	Researchers from a single discipline work together to address a common problem.	Some chemists work together to study the composition, concentration, and proportion of alcohol.
Multidisciplinary teams	Researchers work in parallel or sequentially from a disciplinary-specific base to address a common problem.	A chemist, neurologist, and pharmacologist review the issues of alcohol composition and concentration, the effects of alcohol consumption on the brain, and the effects of alcohol consumption on mental status from the perspective of their respective fields.
Interdisciplinary teams	Researchers work jointly but still on a disciplinary-specific basis to address a common problem.	A chemist, neurologist, and pharmacologist combine concepts and methods from their respective fields in a collaborative study to examine the interrelationships between alcohol composition and concentration, brain chemistry, and the mental status changes caused by alcohol consumption.
Transdisciplinary teams	Researchers work jointly using shared conceptual frameworks drawing together disciplinary-specific theories, concepts, and approaches to address a common problem.	A chemist, neurologist, and pharmacologist conduct a collaborative study to discover the interrelationships between alcohol composition and concentration, changes in brain chemistry, and changes in mental status due to alcohol consumption. They then combine and extend the concepts and methods from their respective fields to develop new frameworks, theories, models, and applications.

Source: Adapted from **Rosenfield** (1992); **Stokols**; **Hall** *et al.* (2008).

2.3. Team science

Although team science itself and its content are not necessarily new, this new label it has been given and the increasing attention being paid to team science is an important recognition that the complexity of scientific challenges requires scientists to transcend disciplinary boundaries and begin working on problems together (**Fiore**, 2008). Health science is at the forefront of the team science field, and it has long been recognized that solving complex health problems not only requires multifaceted thinking but for other disciplines to play a significant role in solving the problems (**Fiore**, 2008). For this reason, team science is becoming the primary architecture for biomedical research and clinical studies addressing complex human health problems.

In fact, the *National Institutes of Health* (*NIH*) have developed their own definition of team science: Team science entails team members with expertise in different health fields working together to integrate their knowledge, skills, and perspectives into clinically focused research projects (*National Research Council*, *NRC*, 2015), the essence of which is the application of multidisciplinary concepts, methods, and theories to create new knowledge to solve complex health problems (**Little** *et al.*, 2017; *National Research Council*, *NRC*, 2015). This definition can be considered a gold standard for the definition of team science (**Baker**, 2015).

On the basis of this definition, the concept of team science has been extended and supplemented. In terms of team size, team science is a scientific collaboration conducted by more than one individual in an interdependent fashion (*National Research Council*, *NRC*, 2015). According to *Enhancing the effectiveness of Team Science*, "team science" is collaborative research conducted by small research teams (up to and including ten people) or large research teams (more than ten people) (*National Research Council*, *NRC*, 2015). In such collaborative research, new insights and solutions are developed by sharing information, resources, and expertise among team members to achieve common goals. This sharing occurs between individuals and administrative units, not only in one discipline but also between different disciplines (**Liu** *et al.*, 2020).

Little *et al.* (2017) point out that team science is a dimension of effective and impactful interprofessional collaborative research practice. Although it is possible for team science to be unidisciplinary, team science most often implies cross-disciplinarity with varying degrees of interaction and integration (**Fiore**, 2008; **Wagner** *et al.*, 2011). In addition, although team science has great prospects for promoting scientific progress, determining which approach is best for achieving the team's goals and maximizing the team's performance is often addressed by assembling leaders in the science community to discuss responses. Yet, the anecdotal evidence generated by such conversations lacks generalizability (**Hall** *et al.*, 2018). Therefore, empirical evidence and evidence-based solutions need to be built to fully realize the potential of team science (**Börner** *et al.*, 2010; **Fiore**, 2008; **Stokols**; **Misra** *et al.*, 2008). It is this need that has directly stimulated the emergence of the Science of Team Science(SciTS).

2.4. The Science of Team Science

The Science of Team Science (SciTS) is a new interdisciplinary field that focuses on the processes by which research teams organize, communicate, and conduct research (**Liu** *et al.*, 2020). An important goal for SciTS is to facilitate "smarter" science (**Stokols**; **Hall** *et al.*, 2008) by using empirical research methods to understand and manage the circumstances that facilitate or hinder the effectiveness of team science initiatives (*National Research Council*, *NRC*, 2015). As a branch of scientific study, SciTS is concerned with understanding, enhancing, and evaluating antecedent conditions, collaborative processes, and the outcomes associated with team science. Additionally, and importantly, the goal is to allow research findings to be translated into new scientific knowledge, practices, and policies (**Croyle**, 2008; **Little** *et al.*, 2017; **Stokols**, 2006; **Stokols**; **Hall** *et al.*, 2008; **Syme**, 2008). The philosophy is similar to virtual team theory, which is based on the "I-P-O model" (**Stokols**; **Misra** *et al.*, 2008). SciTS has two major research streams:

- to find internal and external factors that maximize the efficiency, productivity, and effectiveness of team science;
- to use the knowledge found to improve the effectiveness of collaboration.

Hence, SciTS includes both theoretical and empirical research (**Liu** *et al.*, 2020).

Team science and SciTS are different but related. Team science has given rise to SciTS, which seeks a meta-analysis or meta-understanding of team science (**Little** *et al.*, 2017). Team science focuses on solving particular problems, such as cancer, heart disease, community violence, environmental degradation, etc., through scientific collaborations from multiple disciplines or fields. SciTS, however, focuses on understanding and enhancing the antecedent conditions, collaborative processes, and outcomes associated with team science initiatives, including their scientific discoveries, educational outcomes, and research translations (**Croyle**, 2008; **Stokols**, 2006; **Syme**, 2008). In a word, SciTS contributes to understanding how teams work together to achieve scientific breakthroughs that cannot be realized through individual or simply additive efforts (**Falk-Krzesinski** *et al.*, 2011; **Liu** *et al.*, 2020). However, as with many new and developing fields, the exact delineation of SciTS is unclear, although scholars generally agree that SciTS focuses on understanding and enhancing the conditions, processes, and outcomes of team science (**Liu** *et al.*, 2020).

3. Emergence and development of SciTS

Although research on teams and collaboration has been undertaken for quite some time, the formal introduction of SciTS can be traced back to 2006, when the first conference on the subject was held. The prevailing view in the academic community is that this point marks the official emergence of SciTS. Notably, however, prior to that, some researchers were already contributing to team science. Figure 1 shows some of the key milestones in the SciTS field. Descriptions follow.

3.1. Emergence of SciTS

The scale and complexity of today's biomedical research problems increasingly require scientists to work outside their own disciplines. For example, solving the puzzle of complex diseases ranging from obesity to cancer requires a comprehensive understanding of the interplay between genetics, diet, infectious factors, environment, and behavior. This requires integrating the expertise of biological scientists, mathematicians, physical scientists, computer scientists, and others.
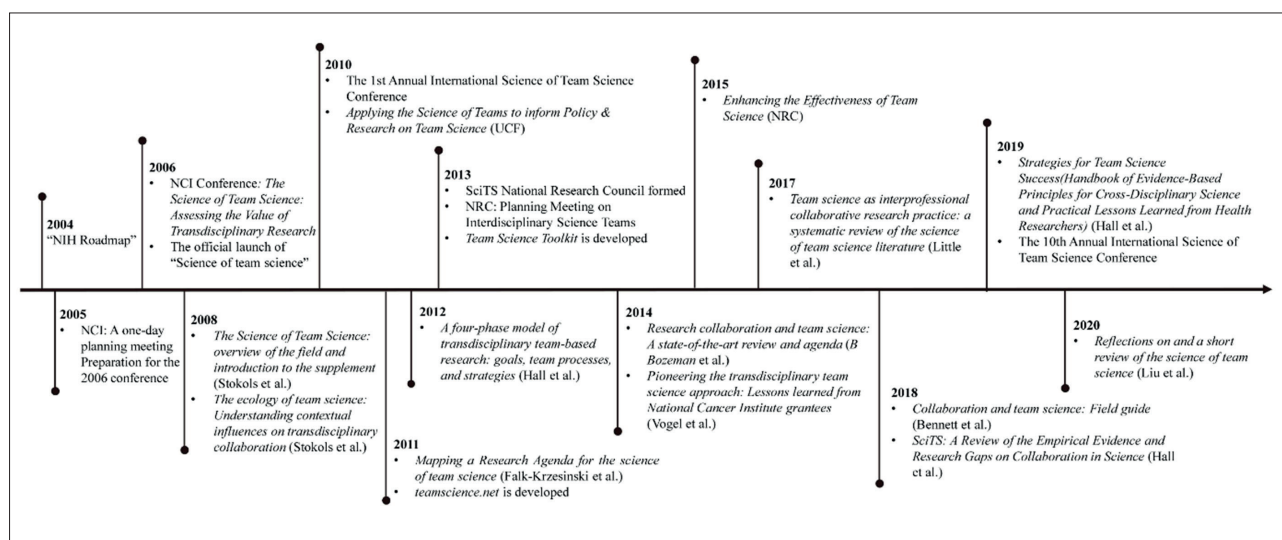
Figure 1. Key milestones in the SciTS field

After recognizing this difficulty, the *National Institutes of Health* (*NIH*) and its leadership in 2004 engaged in a process dubbed the "*NIH* Roadmap", which aimed to transform the way biomedical research was conducted. According to the roadmap, the *NIH* proposed to build teams that were different from traditional research teams. The idea was to improve health through collaborative efforts, including exploratory centers for interdisciplinary research and training for a new interdisciplinary research workforce. Most importantly, the *NIH* encouraged the exploration of new organizational models for team science, which can be seen as an informal instigator for the formal introduction of team science.

In 2005, the *National Cancer Institute* (*NCI*), a division of the *NIH*, invited many scholars in the SciTS field for a one-day planning meeting. The agenda included:

- evaluating the development status of SciTS;
- drafting an agenda of high-priority issues for future study;
- clarifying critical goals and strategies for the 2006 conference; and
- preparing a call for papers from scholars in the field (**Stokols**; **Hall** *et al.*, 2008).

This meeting can be seen as a prelude to the 2006 conference (*Annual International Science of Team Science*).

In October 2006, the *NCI* launched the *Annual International Science of Team Science Conference.* The conference had several aims: addressing ambiguities and gaps in the SciTS literature; promoting further integration of knowledge in the field; and identifying major questions for future study (**Little** *et al.*, 2017). The concept of SciTS was formally proposed for the first time at this conference, marking the official launch of this field. And ever since, SciTS researchers have been developing research agendas with the participation of experts (**Börner** *et al.*, 2010) and stakeholders (**Falk-Krzesinski** *et al.*, 2011), resulting in a wealth of relevant literature that has advanced the field (**Hall** *et al.*, 2018).

The emerging SciTS field was subsequently further developed when the *American Journal of Preventive Medicine* published a supplement based on the proceedings of the 2006 conference in July 2008. In this supplement, Stokols provided an overview of the major conceptual, methodologic, and translational concerns in the SciTS field (**Stokols**; **Hall** *et al.*, 2008). This paper effectively consolidated recent work in the field by assessing the various conceptual issues that must be addressed as a basis for launching future team science initiatives (**Hall**; **Feng** *et al.*, 2008).

3.2. Development of SciTS

3.2.1. *International Science of Team Science Conference*

To better understand how best to engage in team science to facilitate collaborative translational research and meet societal needs, the *First Annual International Science of Team Science Conference* was held in Chicago in April 2010, hosted by the *Research Team Support* (*RTS*) of the *Northwestern University Clinical and Translational Sciences* (*Nucats*) *Institute* (**Falk-Krzesinski** *et al.*, 2010). This event marked SciTS as a new branch of science with an independent research orientation. This conference was the first international, multi-institutional forum dedicated to the emerging empirical field of SciTS. It brought together more than 200 team science leaders and practitioners from multiple disciplines and provided a platform for team science researchers to share the latest evidence-based methods in team collaboration and transdisciplinary research (**Börner** *et al.*, 2010; **Falk-Krzesinski** *et al.*, 2010). Since its

> "The concept of SciTS was formally proposed for the first time at the *Annual International Science of Team Science Conference* launched by *NCI* in October 2006, marking the official launch of this field"

success in 2010, the conference has been held regularly for 13 consecutive years and has been funded by multiple different sponsors, including the *National Institutes of Health* (*NIH*) and *National Cancer Institute* (*NCI*), as well as leading health research institutions (e.g., *Pcori*, *Baxter*, the *Mayo Clinic*, *Kemin*), world-renowned publishers (e.g., *Elsevier*, *ProQuest*), intelligence information providers (e.g., *Thomson Reuters*), developers of team science tools and online platforms (e.g., *VIVO*, *ToolBox*, *Breezio*, *Trellis*), the world's leading universities (e.g., *The University of Chicago*, *Duke University*, *Northwestern University*, *University of Florida*, *University of Central Florida*, *University of California Irvine*, *Michigan State University*), and several prominent associations and foundations (e.g., *The Scientific Research Honor Society*, *Sigma XI*, *John Templeton Foundation*). In recent years, the SciTS conferences have also been funded by the *Army Research Office*. Hence, it is clear that SciTS has become an increasingly supported and recognized field, and its conferences are a nexus for interdisciplinary collaboration. Table 2 summarizes some key details of the previous SciTS conferences.

Table 2. Details of the previous SciTS conferences

Year	Number of conference committees	Host	Location	Partners/Sponsors
2010	11	*Nucats Institute*	Chicago, USA	*Northwestern University; NCRR; NCI; NICO*
2011	14	*Nucats Institute*	Chicago, USA	*NCRR; NCI; University of Chicago; Baxter; Elsevier; RefWorks; Kemin; Recombinant; Arete; VIVO; Wellspring Worldwide*
2012	13	*Nucats Institute*	Chicago, USA	*NCRR; NCI; University of Chicago; Baxter; Elsevier; ProQuest; Recombinant; Takeda; Symplectic; Thomson Reuters; VIVO*
2013	13	*Nucats Institute*	Evanston, USA	*Baxter; Elsevier; Sonic; NICO; ProQuest; VIVO; Thomson Reuters; Team Science Toolkit; InfoReady; Northwestern University*
2014	16	*VIVO/SciTS*	Austin, USA	*Symplectic; Digital Science; Thomson Reuters; Elsevier Research Intelligence; Frontiers; Plum Analytics; Academic Analytics*
2015	15	*National Institutes of Health*	Bethesda, USA	Missing information*
2016	12	*Mayo Clinic*	Phoenix, USA	*Arizona State University; Breezio; Elsevier; Mayo Clinic; Sodexo; AAAS Trellis; University of Central Florida*
2017	13	*University of Central Florida*	Orlando, USA	*University of Central Florida; Templeton Foundation; University of Florida; NIH; AAAS Trellis; University of Missouri; Westat*
2018	16	*University of Texas Medical Branch*	Galveston, USA	*University of Texas Medical Branch; University of Texas; Elsevier; University of Central Florida; Knowinnovation; University of Houston; Michigan State University; IPE[2]*
2019	15	*Michigan State University*	Lansing, USA	*Michigan State University; University of Central Florida; Public Health; University of Michigan; University of Texas Medical Branch; Michigan State University; GW Libraries; UCI; Create for STEM Institute; a2ru; Children's National Health System; Exaptive; University of California-Irvine; Mclaren; Pcori; SMEP; Toolbox; HyLighter; Elsevier; U.S. Army Research Office*
2020	19	*Duke University*	Virtual conference	*Duke University; UNC; SIGMA XI; U.S. Army Research Office*
2021	16	*Virginia Tech*	Virtual conference	*Virginia Tech; U.S. Army Research Office*
2022	19	*University of Central Florida*	Virtual conference	*Army Research Office; John Templeton Foundation; Ghuccts; University of Maryland; Renci; UCF SMST; University of Virginia; VIMS; University of Wisconsin-Madison*

*Note: Information on partners/sponsors for the 2015 conference is missing.

3.2.2. Academic teams and organizations

The development of team science has brought about scientific breakthroughs but also created many challenges that, if not addressed, may mean that researchers do not achieve their project goals. Thus, there is a critical need for evidence-based guidance to address these obstacles. Based on this, in 2013, the *National Science Foundation* (*NSF*) requested that the *National Research Council* (*NRC*) establish a *Committee on the Science of Team Science*. Consisting of 13 experts, the committee is dedicated to conducting a consensus study to discover the individual, organizational, and environmental factors that influence the effectiveness of scientific teams – factors like team composition, leadership, and management, institutional structures, funding, and policies.

In 2015, the committee launched a report at the *National Academies Press* titled *Enhancing the Effectiveness of Team Science*. The report is the result of an in-depth, evidence-based study to analyze what is currently known about the processes and outcomes of team science, under what circumstances investments in team-based research are most conducive to maximizing benefits, and in what projects investments are most likely to yield intellectually novel discoveries and significant improvements in social, environmental, and public health issues. The report covers factors that influence the effectiveness of team science at the individual- and team-levels, as well as at the institutional- and organizational-le-

vels. Its findings provide evidence-based guidance for the challenges faced in developing team science. When examining how individual- and team-level factors relate to effectiveness, the committee drew heavily on diverse methodological and conceptual approaches from SciTS and social science fields. When examining how organizational- and institutional-level factors relate to team

> SciTS conference is becoming a representative conference for interdisciplinary collaboration, with more institutions or organizations supporting and recognizing it

effectiveness, the committee conducted literature reviews and undertook case studies on science policy, team management, and other aspects in companies, universities, research institutes, and other institutions. Until this report, many research findings were too fragmented to help the field pool understand and apply the knowledge scattered across different research areas by team science practitioners. Thus, with this report, the committee made a very significant contribution to integrating and translating the sum knowledge of the field. Additionally, the report includes nine recommendations for the ongoing development of team science and possible directions for further research.

The *International Network for the Science of Team Science* (*INSciTS*) is the membership organization for all stakeholders invested in team science. It is a forum for sharing the latest evidence for what works in team science and for collaborating with one another to advance the SciTS field. *INSciTS Special Interest Groups* (SIGs) are member-led groups that provide a "home away from home" for *INSciTS* members to connect and collaborate with one another who share common interests in the SciTS field. SIGs help to build communities around shared interests, and members of these SIGs collaborate throughout the year to advance research in key priority areas (*INSciTS*, 2022). The currently active SIGs are listed in Table 3.

Table 3. Active SIGs and their example topics

Active SIGs	Example topics
Fostering Team Science In Academia	Appointment, promotion, and tenure policies Institutional organization and structures (centers, cross-departmental), Funders' influence - funding mechanisms, policies, guidelines, requirements Publishing opportunities and challenges
Team Science Education & Training	Development and dissemination of training and educational resources Undergraduate, graduate, and early career training Professional development Team science competencies
Team Incubation and Acceleration	Developing incubator activities and spaces at academic institutions Stimulating creativity through incubator activities and spaces Sharing/designing/disseminating best practices to support scientific teams Creating evidence-based interventions for team science
Scientometrics and Data Analytics for Team Science	Scientometrics indicators of team outcomes and communications patterns Network analysis for scientific collaborations Mechanisms and evaluation criteria for authorship in scientific publications Measuring interdisciplinary/novelty/conventionality in collaborative research
Interdisciplinary Executive Scientists, Research Development Professionals, and I²S (Integration and Implementation Sciences) *Specialists*	Developing the profession Professional development – effective best practices, tools, methods, etc. Evaluation Hiring, promotion, and tenure

3.2.3. Team science initiatives

The growing recognition that collaboration among scientists from different disciplines will foster solutions to complex scientific problems has spurred initiatives to train researchers to collaborate in cross-disciplinary teams (**Ho** *et al.*, 2021). There has been a surge of interest and investments in large-scale team science programs to realize the unprecedented opportunities this research paradigm poses. Both public institutions and private foundations have funded and launched a large number of team science initiatives specifically designed to develop collaborative and often cross-disciplinary approaches to address complex and particular phenomena (**Fiore**, 2008; **Okamoto** *et al.*, 2015; **Stokols**; **Hall** *et al.*, 2008; **Stokols** *et al.*, 2006). For example, the *NIH*'s *National Center for Research Resources* funded the *Clinical and Translational Science Awards* (*CTSA*) to encourage researchers across disciplines to form teams and turn experimental discoveries into treatments for clinical patients (**Börner** *et al.*, 2010). The *Centers for Population Health and Health Disparities* program (*CPHHD*) was established to address health inequities and health disparities by combining approaches from different disciplines (e.g., those in the physical, biological, social, and behavioral sciences), analyzing their causes, and formulating appropriate interventions and policies (*National Institutes of Health*, NIH, 2010; **Okamoto** *et al.*, 2015). In mobile health, the *NIH*-supported annual *mHealth Training Institutes* (*mHTI*) has commenced an immersive training program intended to cultivate scientists who can engage in and lead interdisciplinary collaborations dedicated to finding effective mobile health (*mHealth*) solutions to complex healthcare problems (**Ho** *et al.*, 2021). Another initiative, the *Advancing Geriatrics Infrastructure and Network Growth* (*Aging*) *Initiative*, was funded by the *National Institute on Aging* in 2014 for a period of 3 years to develop team science infrastructure to advance research on multiple chronic conditions (MCC)

(**Garg** *et al.*, 2018). In cancer research, the *Transdisciplinary Research on Energetics and Cancer* (*TREC*) was established and funded by the *National Cancer Institute* (*NCI*) from 2005 to 2016. This was an interdisciplinary collaborative center looking at energy balance and cancer, whose mission was to study the relationships between obesity, nutrition, physical activity, and cancer. *TREC* integrated interdisciplinary knowledge from the social, behavioral, clinical, and basic sciences and proposed and implemented new interventions to reduce the burden of these diseases (**Hohl** *et al.*, 2021; **Patterson** *et al.*, 2013).

3.2.4. Supporting tools

Conducting team science presents important challenges for investigators that are sometimes more complex than in traditional single-investigator studies. For example, information and resources on the availability and reliability of team science, scientific collaboration, and cross-disciplinary research have been rare in the past. In addition, data sharing, communication, team leadership, and conflict resolution can all be difficult issues to navigate even for seasoned investigators. Moreover, traditional research tools and technologies often barely meet all the needs of today's research. As a result, researchers are developing and using more powerful web-based support tools to help conduct their research. Some of the more commonly used and representative tools include *Team science toolkit*, *Toolbox project*, *Teamscience.net*, *Research toolkit*, *VIVO*, and *Science of Science* (*Sci2*). These are summarized below.

Team Science Toolkit

Developed by the *National Cancer Institute* (*NCI*), the Team Science Toolkit is an interactive website that contains plenty of resources and information on team science practices and research to help users support, conduct and study team-based research. The purpose of the toolkit is to integrate cross-disciplinary knowledge, share experiences, and prevent any unnecessary duplication of effort. In addition, it provides a forum for sharing knowledge and practical experiences that are proving to play an important role in improving the effectiveness and efficacy of team science programs (**Vogel** *et al.*, 2013).

Toolbox Project

Supported by the *National Science Foundation* (*NSF*), the *Toolbox Project* is a training intervention designed to facilitate cross-disciplinary communication in science teams and groups. It provides a philosophical yet practical enhancement to cross-disciplinary, collaborative science. Specifically, the *Toolbox Project* systematically uses philosophy to help collaborators abstract away from their specific disciplinary differences and instead move toward conceptual common ground. It encourages collaborative teams to use philosophical approaches to enhance their conceptual understandings, and thereby foster the mutual understanding necessary for cross-disciplinary research. Through these themes, teams are enabled to meet project challenges more effectively (**Eigenbrode** *et al.*, 2007; **O'Rourke**; **Crowley**, 2013).

Teamscience.net

Supported by the *NIH* and developed by the *Northwestern University Center for Applied and Translational Sciences Institute*, *Teamscience.net* is a suite of e-learning resources that provides examples of real-life scenarios unique to team-based research (*Teamscience.net*, 2022). The purpose of *Teamscience.net* is to enhance skills for participating in or leading interdisciplinary and transdisciplinary science teams or groups. Within this web-based tool, there is a project named *Coalesce*, whose main goal is to build, evaluate and share up-to-date and easy-to-read resources online to facilitate learning and skill development in team science (**Aronoff**; **Bartkowiak**, 2012; **Yu** *et al.*, 2019).

VIVO

Supported by *NIH*, *VIVO* is a free, open-source web application that helps researchers search for other researchers by publication, research area, and teaching or professional affiliations across institutional boundaries (**Börner** *et al.*, 2012). For example, *My Dream Team Assembler*, which was developed and built by the *Sonic Research Group* at *Northwestern University* in close collaboration with the *Atlas Lab* of *Northwestern University*, is based on *VIVO*. The program recommends potential scientific collaborators and helps to form teams.

In addition, the *Researcher Toolkit* is an open-access web-based tool that provides resources to make research involving interdisciplinary collaborators easier. *Science of Science (Sci2)* is a tool for research and practice in the science of science. It supports temporal, geospatial, topical, network analysis and the visualization of scholarly datasets.

4. Research progress of SciTS

4.1. Data sources

From the previous section, we can see that SciTS is growing in an orderly and steady fashion. In this section, we hope to reveal some of the progress made by SciTS researchers by analyzing the characteristics of the literature and the research topics covered in the field. Our first step was to collect all SciTS publications indexed by the *Web of Science* (*WoS*) *Core Collection* (*Science Citation Index Expanded*, *Social Sciences Citation Index*, *Arts & Humanities Citation Index*) through the following data retrieval strategy:

TS = ("team science") AND PY=2005-2022
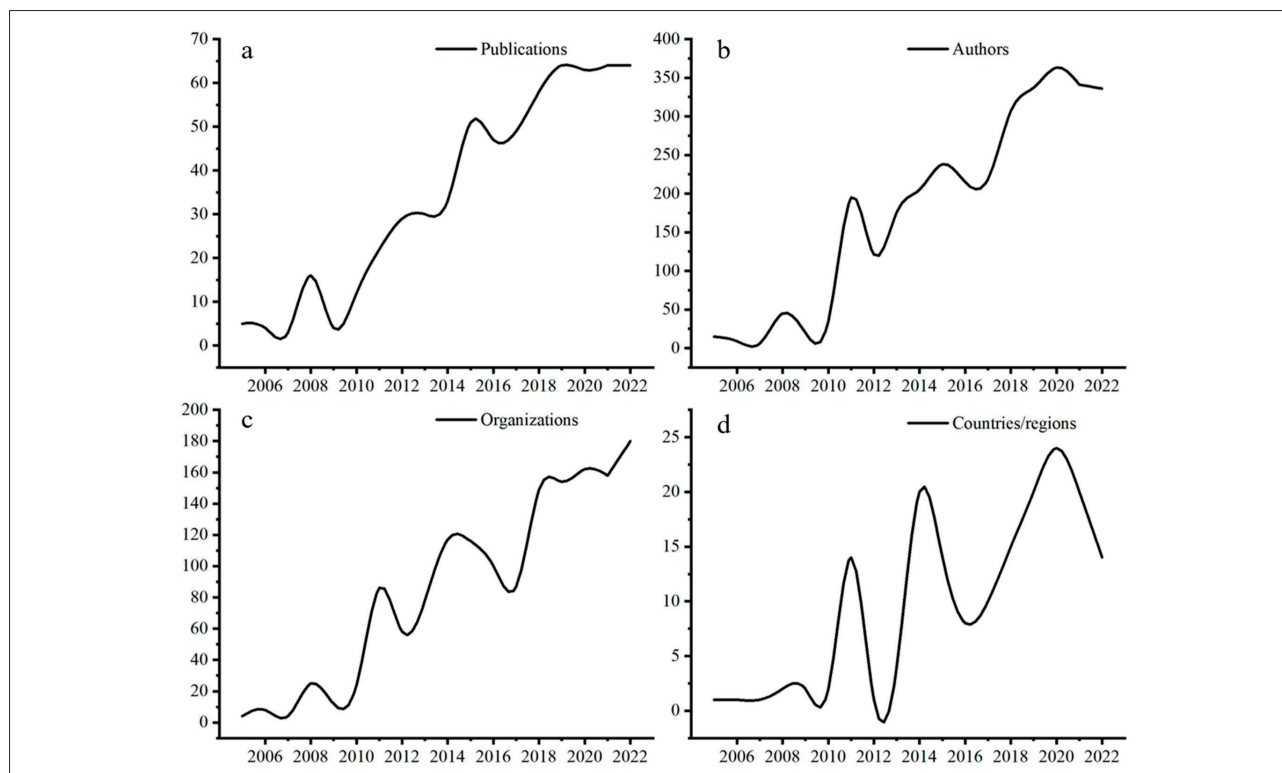
Figure 2. Distribution characteristics of SciTS publications

Selecting core lexical queries was essential for developing our search strategy (**Huang** *et al.*, 2015). Ultimately, we opted to only use "team science" as the core term to maximize the number of potentially relevant studies found. This met our objective of retrieving a comprehensive representation of publications on SciTS. Additionally, 2005 was chosen as the starting year because the first call for SciTS papers came out of the 2005 planning meeting. These studies are important and valuable as they represent the beginnings of team science research.

This search, conducted on November 3rd, 2022, resulted in 618 research publications. After a detailed data-cleaning process with *VantagePoint*, a powerful text-mining tool for discovering knowledge from literature databases, we arrived at our final dataset, which was used for further analysis.

4.2. Characteristics of the literature

The number of SciTS articles published per year is shown in Figure 2a. As team science has developed, total publications have increased, indicating that team science has become increasingly prevalent. Figures 2b, 2c, and 2d, respectively, show how SciTS has developed in terms of micro-level authors, meso-level organizations, and macro-level countries. We see that the number of authors, organizations, and countries/regions involved in team science research has generally risen, indicating that team science research is receiving more attention. Indirectly, these results reflect that the field has important research value. The United States has contributed significantly to the development of team science. For most years, the US accounts for a very high share of publications, typically exceeding 60%. Particularly in the first few years of SciTS's emergence, the US's participation rate was close to 100%. However, in more recent years, the discipline has started to spread to other countries, and the proportion of US articles has slightly declined. That said, the US's dominance over the field remains unquestionable.

4.3. The trend of interdisciplinary integration

SciTS is an emerging interdisciplinary field whose development is inseparable from the cross-integration of methods, tools, and knowledge in multiple disciplines. Therefore, to understand the disciplinary distribution and the dynamics of interdisciplinary integration in the field, we turned to *Science Overlay Mapping* (**Carley** *et al.*, 2017; **Ràfols** *et al.*, 2010). Science overlay mapping is a method of visualizing the relationships between disciplines within a field. As shown in Figure 3, the nodes represent *Web of Science* categories, the size of the node represents the number of publications, and nodes of the same color indicate that the categories belong to the same disciplinary cluster.

Combining Figure 3a with Figure 3b, we can see that SciTS publications mainly span Public Environmental Occupational Health, Medicine Research Experimental, Oncology, Medicine General Internal, and Health Care Sciences Services. All these disciplines are related to medicine, which is closely related to the fact that team science has its origins in the field of health sciences. In addition to the-

> The SciTS field is receiving more attention, with significant contributions from U.S. scholars
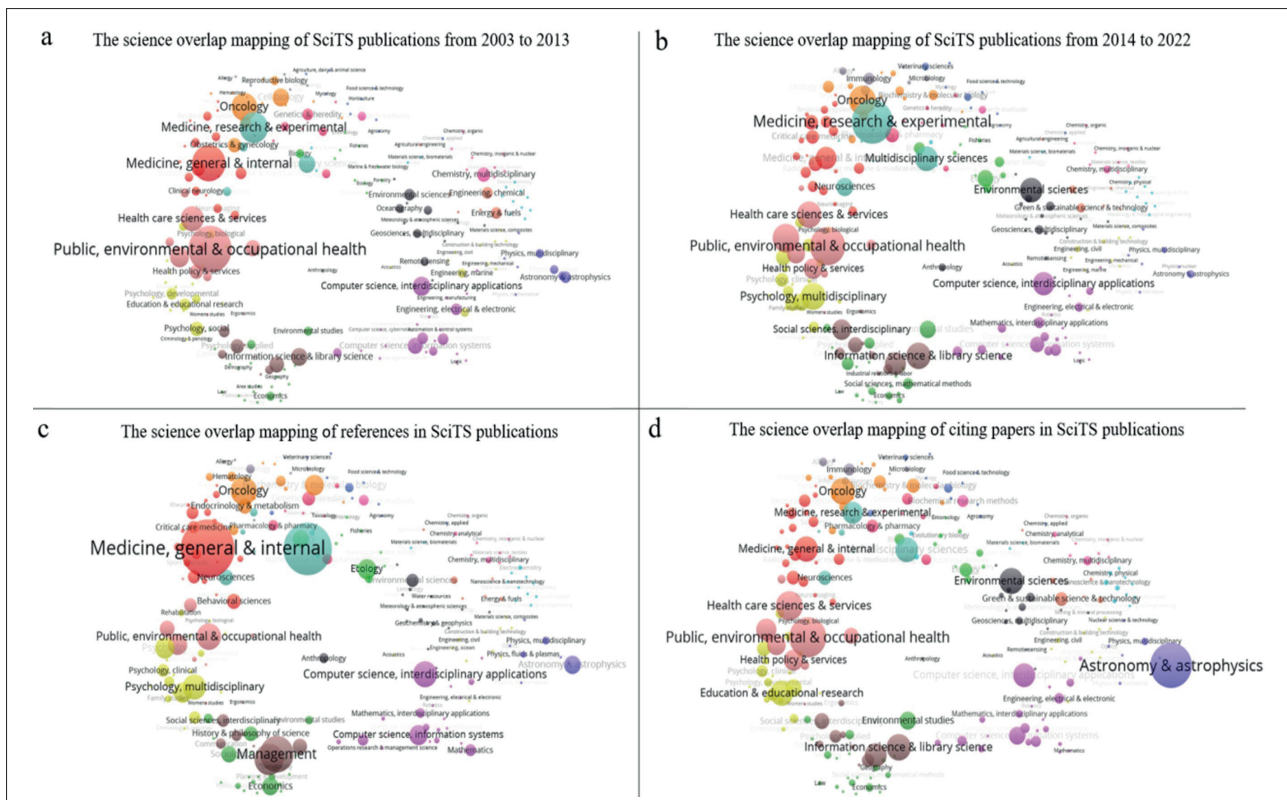
Figure 3. Science overlay maps based on SciTS publications

se medical disciplines, SciTS publications are also found in Information Science, Library Science, Psychology, Computer Science, Interdisciplinary Applications, and Management, etc. This shows that these disciplines are also discussing team science and interdisciplinary research. In terms of SciTS's temporal evolution, more disciplines were involved in the field in 2014-2022 than in 2005-2013. Hence, the reach of the field is growing. This observation also indicates that the interdisciplinary characteristics of team science are becoming more prominent, and the trends in interdisciplinary integration are becoming more obvious.

From the perspective of references, we can see which disciplines have played a key role in supporting the development of SciTS. From the perspective of citing papers, we can see which disciplinary problems SciTS is trying to solve by integrating interdisciplinary knowledge. The SciTS publications we retrieved included a total of 22,971 references as well as 10,246 citing papers. Science overlay maps for the references and the citing papers are shown in Figures 3c and 3d, respectively.

Comparing Figure 3c with Figure 3d, we can see that there are certain differences between the knowledge inputs and knowledge outputs of SciTS. In terms of knowledge inputs, the rise of SciTS has mainly been off the back of disciplines such as Medicine (General Internal), Multidisciplinary Science, Management, Business, Oncology, Public Environmental Occupational Health, Computer Science Interdisciplinary Applications, and Psychology Multidisciplinary (see Figure 3c). These disciplines have provided the knowledge, experience, methods, and tools for teamwork and interdisciplinary research. In terms of knowledge outputs, the research results from SciTS have been mostly digested by the disciplines of Astronomy Astrophysics, Public Environmental Occupational Health, Health Care Sciences Services, Oncology, Information Science Library Science, Environmental Sciences, Education & Educational Research and Medicine General Internal (see Figure 3d). In summary, team science has mainly combined the theories, perspectives, tools, and methods from Medicine (General Internal), Multidisciplinary science, Management, Business, and other disciplines to address the major research problems involved and faced by Astronomy Astrophysics, Public Environmental Occupational Health, and Health Care Sciences Services, among others.

4.4. Research topics

The clustering analysis of author keywords reveals the research themes that SciTS researchers have focused on. The data cleaning and processing protocol included: (1) removing meaningless words, such as trends, issues, globe, goals, etc.; (2) merging subject terms with the same meaning, such as singular and plural words, keywords with a switched word order but the same connotation, synonyms or near-synonyms, full names and abbreviations, etc.; and (3) removing three high-frequency keywords, being "team science", "SciTS" and "the science of team science", along with keywords with a frequency of less than 2. After clustering based on the Leiden algorithm (**Traag** *et al.*, 2019), we built a topic cluster map of the field, which is shown in Figure 4. As illustrated, the field comprises seven main clusters of research.

Figure 4. The topic clustering map of the SciTS publications

4.4.1. The definition and theory of the Science of Team Science

The orange nodes in Figure 4 form a cluster that contains some relatively large nodes, such as collaboration, cross-disciplinary collaboration, interdisciplinary research, framework, evidence-based medicine, transdisciplinary, qualitative methods, and meta-analysis. These are the most basic attributes of SciTS itself.

In this cluster, the contemporary science community has adopted a problem-driven approach to knowledge production, which tends to blur the boundaries between disciplines. Further, as **Milojević** (2014) reports, knowledge permeability has become increasingly evident, leading to the emergence of cross-disciplinarity. It is also suggested that team science would benefit from further developing interdisciplinary research in its quest to address complex research questions. Additionally, the development of evidence-based practices and policies should be promoted by integrating methods and theories from multiple disciplines (**Hall** *et al.*, 2018).

In terms of the theoretical development of SciTS, M. Little concludes that team science is a dimension of interprofessional collaborative practice that allows professionals or practitioners from multiple disciplines to collaborate by leveraging different perspectives and knowledge (**Little** *et al.*, 2017). W. Bedwell argues that cross-disciplinary collaboration is an integrated, multi-level concept that requires an overall view of collaboration (**Bedwell** *et al.*, 2012). Indeed, collaboration is essentially a back-and-forth process that requires each party involved to actively contribute in some way across the lifecycle of collaborative effort (**Bedwell** *et al.*, 2012). D. Stokols highlights the important roles of systems theory and systems thinking in helping SciTS to develop, such as the ability to reveal the interdependencies among systemic units that operate at these different levels (**Stokols**; **Hall** *et al.*, 2008), but which has been largely neglected (**Morrison**, 2008; **Provan** *et al.*, 2008). On the other hand, Pedro J. Ramos-Villagrasa *et al.* use a systematic review to present a view of teams as complex adaptive systems, which allows for a better understanding of teams and team science (**Ramos-Villagrasa** *et al.*, 2018).

In terms of the models and frameworks used in SciTS, the *Wisconsin Interventions for Team Science* (*WITS*) is a dynamic framework whose primary goal is to evaluate the effectiveness of translational team interventions so that evaluation results can be used to support subsequent team science programs (**Rolland** *et al.*, 2021). As another example, K. Hall and J. Holmes present multistage conceptual frameworks that have been used to guide transdisciplinary research, training,

and community intervention efforts within initiatives undertaken by the *NCI Cphhd* and *TREC* (**Hall**; **Stokols** *et al.*, 2008; **Holmes** *et al.*, 2008). From the perspective of the collaboration process, **Tuckman** (1965) proposes a five-stage team development model that is considered to be the basic foundation of the team development model:

- the forming stage;
- the storming stage;
- the norming stage;
- the performing stage; and
- the adjourning stage.

> Investments in team science initiatives need to be strategic and should be reserved for those research topics that are best suited to and would benefit most from interdisciplinary collaborative approaches

In addition, some scholars have put forward an antecedent-process-outcome model in which the antecedent and process variables specified in the model influence several near-, mid-, and long-term outcomes of scientific collaboration (**Stokols** *et al.*, 2003). Similarly, other scholars have developed an input-process-output model that can be used to identify and describe the characteristics and effectiveness of cross-disciplinary integration (**Bugin** *et al.*, 2021).

In conclusion, many studies in SciTS discuss team science issues by introducing theoretical models and conceptual frameworks from other fields to add a more intuitive understanding of team science. Some examples of the theoretical models used to describe interdisciplinary team science include the social-ecologic model (**Stokols** *et al.*, 2005), systems thinking and complexity theory (**Shen**, 2008), network analysis (**Nash**, 2008), the social-determinants paradigm (**Morgan** *et al.*, 2003), paradox theory, and more. These theories and models are drawn from such diverse disciplines as sociology, ecology, physics, and biology, with a primary focus on understanding the factors that facilitate or hinder the development of team science (**Hall**; **Feng** *et al.*, 2008).

4.4.2. Team composition and collaboration patterns

The cluster of blue nodes in Figure 4 features interdisciplinary teams, diversity, networks, collaboration patterns, ethnicity, team development, collaboration scale, gender, and early-career investigators. These nodes mainly reveal the constituent elements of teams and the collaboration patterns shaped by the attributes of the team members.

Research teams are always organized around a purpose that is accompanied by a desire to achieve certain goals and improve upon past research performance. Team composition is an important aspect of this paradigm. It involves a team's structure, its collaboration patterns, how its affective states are shaped, the behavioral processes at work, and the cognitive states that ultimately affect how teams achieve their goals (i.e., the ABCs of teamwork) (**Bell** *et al.*, 2018).

Team composition has two connotations. For a start, team composition refers to the team members' attributes, such as age, gender, country, university, sector, ethnicity, mother tongue, interdisciplinarity, academic rank, and professional role, as well as the cultural context within which members were brought up and received training, as shown in Table 9. Additionally, the attributes of the team, such as its size, diversity, spirit, leadership, and levels of inclusion, are equally important factors in team composition, as shown in Table 4. All of the above largely influences the effectiveness of teamwork (**Liu** *et al.*, 2020).

Table 4. Some elements of team composition

Elements	**Description**
Age	Younger *versus* older researchers
Gender	All-female, all-male, mixed
Country	National or international
University	Same university or more than one university
Sector	Same-sector or multi-sectorial
Ethnic	The relationship between ethnic belonging and group identification
Mother tongue	Members speaking the same language or different languages
Interdisciplinarity	Unidisciplinarity or cross-disciplinarity
Academic rank	From doctoral students to full professors (in university teams)
Leadership	The relationship between leader characteristics and team effectiveness
Team size	Number of team members
Team diversity	Levels of difference in team member attributes
Team spirit	Whether teams have a sense of belonging, honor, and cohesion
Team inclusion	Acceptance of differences and promotion of trust among members

Source: Adapted from **Liu** *et al.* (2020).

Scholars often use empirical research methods to argue over which characteristics of team science and which team compositions are the most conducive to achieving goals or improving performance. For example, studies on the gender of team members have found that heterosexual collaboration tends to lead to better outcomes than same-sex collaboration (**Campbell** *et al.*, 2013). In terms of academic rank, the team's results tend to have a greater citation impact when the team includes at least one full professor (**Bales** *et al.*, 2014) or a more senior first author (**Stvilia** *et al.*, 2011). When it comes to team size, some studies have shown that larger teams are often more productive (**Jeong**; **Choi**, 2015) and impactful

> *Seven main streams of research in SciTS field, which are: the definition and theory of SciTS, team composition and collaboration pattern, team formation and team functioning, physical environment and culture of teams, institution and organization for teams, training and education of interdisciplinary collaboration, and the measurement and evaluation of team science*

(**Sud**; **Thelwall**, 2016), while others have found that small teams are more likely to generate new disruptive ideas (**Wu** *et al.*, 2019). Studies on diversity have shown that high levels of diversity have certain advantages (**Guan** *et al.*, 2015). However, too much diversity can lead to fragmentation and inefficiencies. There are too many relevant research findings to list them all, but, in general, it is clear that team composition is directly related to the effectiveness of collaboration and how the team performs.

4.4.3. Team formation and team functioning

The dark green cluster in Figure 4 contains nodes such as team processes, team effectiveness, knowledge integration, management, social networks, leadership, proximity, experiences, engagement, and knowledge translation. These themes primarily pertain to team formation and team functioning. The former is focused on "who should be part of a team and how to find them", while the latter is focused on "what strategies should be used to improve team functioning".

Team formation is different from team composition. Team composition focuses on which factors help teams achieve their goals and/or improve team performance, while team formation is primarily concerned with how to form a team of researchers with different areas of expertise to solve a particular research problem at a minimal cost.

The issue of team formation has been studied for some time. M. Büyükboyaci finds that letting workers voluntarily join teams can help to form skill-complementary teams where each worker is able to focus on the task they do best. Moreover, such endogenous team formation can positively impact overall productivity (**Büyükboyaci**; **Robbett**, 2019). In addition to self-organization, the process of team formation can also be seen as an NP-hard problem (non-deterministic polynomial-time hardness), which is to find workers who can contribute their efforts and accomplish a specific task at the lowest cost. Thus, the methods applied to NP-hard or NP-complete problems may be strong applications of team formation (**Yu** *et al.*, 2019). At present, heuristic approaches have already been used to solve the issue of team formation. For example, Fitzpatrick and Askin designed a heuristic solution for forming maximally effective teams that consider innate tendencies, interpersonal skills, and technical skills (**Fitzpatrick**; **Askin**, 2005). Another example is the simulated annealing algorithm developed by Baykasoglu, which solves a fuzzy optimization model. It selects the right team members for a project who should together be able to perform a particular task within a given deadline (**Baykasoglu** *et al.*, 2007).

Team formation is influenced by many factors, including physical proximity, social ties, brokers, and prior experience with collaboration (**Hall** *et al.*, 2018). Among these, physical proximity increases the likelihood of forming new collaborations and obtaining funding (**Binz-Scharf** *et al.*, 2015). For example, researchers located within the same department or institution are more likely to form collaboration teams (**Kabo** *et al.*, 2014). In addition to physical proximity, social ties are a crucial factor in team formation. A. Smith and J. Wang argue that weak social ties contribute to team formation, but the balance between weak and strong social ties is more important for team development (**Smith** *et al.*, 2016; **Wang**, 2016). Furthermore, in social relationships, brokers can act as intermediaries between researchers, linking otherwise isolated individuals to form new collaborations (**Murthy**; **Lewis**, 2015). From collaboration experience, researchers tend to collaborate with past collaborators (**Lungeanu**; **Contractor**, 2015) or choose partners with a pleasant collaboration history to continue working together. However, a recent study found that fresh teams have higher originality and a more-diverse impact compared to older teams (**Zeng** *et al.*, 2021).

After a team has been formed, the critical issue is what strategies should be used to ensure the team works effectively, which is exactly what team functioning considers. Team functioning is the process by which team members work together to achieve a common goal. In other words, team functioning is the process of transforming team inputs into team outputs, such as team effectiveness, collaboration efficiency, satisfaction, etc.

Effective team functioning relies on the right management style, which includes effective leadership behaviors, a positive and enjoyable collaborative environment, and other such factors. Early studies on teams suggest that leadership substantially influences collaborative processes and outcomes (**Morgan** *et al.*, 2003; **Stokols**, 2006). Effective leaders are skilled at generating and maintaining trust, fostering shared dreams among members, and providing them with direction, meaning, and hope. At present, there is a strong call for "transformational leaders", which refers to leaders who are

able to communicate a shared vision and maximize the potential of their team members through intellectual stimulation and personalized care to achieve the highest levels of team performance (**Li** *et al.*, 2017).

Members of interdisciplinary teams are often heterogeneous. So, to achieve effective team functioning, leaders need to know how to manage and embrace differences (**Bennett**; **Gadlin**, 2012). When managed properly, the

> *It is necessary to inspire scholars from more countries to participate in the SciTS research to bolster underrepresented groups in team science, thereby building a multicultural and multi-stakeholder subject area*

diversity of a team can be a powerful resource, as different knowledge and perspectives can be integrated to solve problems (**Mannix**; **Neale**, 2005). Meanwhile, trust plays a crucial role in team functioning and collaboration effectiveness. Research has shown that trusting relationships in teams facilitate knowledge sharing and, thus, the achievement of team goals (**Mutahar** *et al.*, 2022). Conversely, when there are conflicts in a team, knowledge-sharing behaviors are reduced (**Xia**; **Ya**, 2012). Although conflict is inevitable in team functioning, its impact can be greatly minimized by managing and anticipating (**Bennett**; **Gadlin**, 2012). For example, accurate decision-making and good communication can effectively mitigate team conflicts, thereby enhancing mutual understanding and facilitating the inclusion of diverse ideas (**McGreavy** *et al.*, 2015).

In addition, the process of team functioning includes three team states: namely, affective, behavioral, and cognitive processes (**Hall** *et al.*, 2018; **Liu** *et al.*, 2020). In terms of affective states, a good affective state between team members will reduce the possibility of friction and discord and enhance team cohesion. U. Ghuman demonstrates that team performance improves and learning capacity increases if the team can develop emotional awareness and hence positively manage the emotional relationships at play within the team (**Ghuman**, 2016). In terms of behavioral states, face-to-face communication is a more effective communication medium than virtual forms, such as video conferencing (**Jeong**; **Choi**, 2015). In addition, the right collaboration behaviors are crucial in team science, including the division of responsibilities for tasks, knowledge transfer among researchers, the development of training programs, etc. (**Cummings**; **Kiesler**, 2007). In terms of cognition states, it has been shown that there is a strong relationship between team cognition and team performance (**Fernández** *et al.*, 2017). A key feature of improving interdisciplinary team performance is the development of shared mental models among team members (**Hall** *et al.*, 2018). When there is some synchronization between the team's overall goals and the team members' aspirations and career needs, that team tends to function more smoothly and efficiently (**Zucker**, 2012).

4.4.4. Physical environment and culture of teams

The predominant topics in the light green cluster in Figure 4 include knowledge sharing, culture, support, virtual environments, face-to-face contact, trust, team communication, decision-making, and conflict management. These keywords all relate to one's physical environment and cultural factors influencing interdisciplinary team collaboration.

The physical environment in teamwork refers to work-related infrastructure. Early studies of team environments, such as **Sundstrom** *et al.* (1990), demonstrate the importance of physical environments for team development, such as opportunities for face-to-face contact, comfortable meeting areas, distraction-free office and laboratory settings, private workspaces, and shared team spaces.

Technology-mediated collaboration has changed the way people interact with their socio-physical environments. Interdisciplinary collaborative research is no longer limited to the same institution or country. In international collaborations, working across multiple time zones means that team members are in different stages of their circadian rhythms. These time differences can mean that team members are not always in the best working condition when they collaborate. Also, remote collaboration makes it difficult to grasp the mental and emotional state of partners. As a result, remote collaborations may suffer from poor coordination and reduced efficiency. By contrast, physical proximity, which also implies there is no time difference between collaborators, can generate more frequent contact and prompt informal communication, which is important for a good collaboration (**Stokols**; **Misra** *et al.*, 2008). Face-to-face contact, in particular, can increase the frequency and efficiency of information exchanges and promote the transfer of knowledge, especially tacit knowledge (**Knoben**; **Oerlemans**, 2006). This is because team science projects spend a substantial amount of time in group meetings and brainstorming sessions. Therefore, in addition to the conditions for face-to-face communication, there is also a need for an environment that meets a variety of office needs, such as comfortable meeting spaces for teams to conduct group discussions and brainstorming along side private, distraction-free workspaces. Some studies have already pointed out whether the team members like their physical environment positively correlates to their levels of cross-disciplinary collaboration (**Stokols**; **Misra** *et al.*, 2008).

Team culture is also an important measure in team environments. Culture is defined as shared cognitive structures and consensus around culturally correct values, attitudes, and normative behaviors (**Strekalova**, 2022). A team-friendly environment requires a team culture of integrity, trust, respect, and sharing from the top down. Leadership plays a key role in the formation and development of team culture. Thus, studies on how leadership can foster a team culture are important works of research in the SciTS field. Studies on how team cultures can address differences in discipline, gender, race, and other background attribute to maintain cohesion and productivity are particularly valuable (**Lee**; **Jabloner**,

2017). Furthermore, in terms of conflict culture in teams, good scientific teams need good conflicts. In team science, one must recognize the danger of artificial harmony, which refers to team members acting as if they get along well in an environment where serious problems are not being addressed. Instead, the right team culture is one that empowers teammates to express their opinions, leading to healthy disagreements and debates. Therefore, teams must master the art of identifying and realizing the best level of conflict for them to achieve optimal team performance (**Sen**, 2021).

4.4.5. Institution and organization for teams

The purple cluster in Figure 4 assembles the themes related to cyberinfrastructure, organization, sustainability science, institutions, research funding, policy, workforce development, incentives, tenure and promotion, and similar. These themes concern the institutional and organizational factors that affect collaboration in interdisciplinary teams, such as nonhierarchical organization structures, strong organizational incentives, an inclusive and shared organizational climate, and diverse organizational activities.

Different opinions exist about the ideal organizational structure to support successful collaborations between professionals from a wide variety of disciplines. However, the traditional hierarchical pyramid still dominates. Rigidly structured organizations that are managed from the "top-down" often fail to provide an optimum environment for self-motivation, creativity, and engagement –all of which are important requirements for effective collaboration (**Cross** *et al.*, 2011; **Hardin** *et al.*, 2017; **Swensen** *et al.*, 2016). The other type is a nonhierarchical organization structure. This refers to a collaboration in a culture of equality and is a structure that recognizes each individual team member's specific and complementary skills. It considers that people have common and aligned interests, which can provide the basis for transparent, fair, and productive collaborations. In this organizational structure, team members have a certain autonomy to participate in goal-setting and decision-making, which is considered an effective means of advancing efficiency and innovation (**Eekhoff** *et al.*, 2020). Since team science activities are often oriented toward important projects that require high levels of collaborative efficiency, as well as innovation, a nonhierarchic organizational structure may be more appropriate.

In terms of incentives, a strong organizational incentive is a prerequisite for sustaining motivation among participants in team science initiatives. Incentives also facilitate participation and help sustain collaborations. Broad-based institutional support for team science initiatives and rewards for collaborative research can increase the willingness of researchers to collaborate. For example, one could change university tenure and promotion policies to give more recognition and rewards to those who engage in team science initiatives (**Rhoten**; **Parker**, 2004; **Stokols**, 2006). Further, support from funding institutions is critical to achieving the potential value-adds from interdisciplinarity, especially when attempting to mount large-scale interdisciplinary initiatives (**Lyall** *et al.*, 2013). Likewise, long-term funding is essential for building sustainable partnerships between coalition members (**Stokols**, 2006).

An inclusive and sharing organizational climate is a catalyst for interdisciplinary collaboration. Team science requires the integration of multiple disciplinary perspectives to better understand and ameliorate big problems. Therefore, the breadth of disciplinary perspectives represented within the collaborative team or organization is critical to teamwork. It has been shown that working groups that welcome diverse opinions and adopt a worldview tend to communicate more. They are also more likely to include knowledge-bridging collaborators, which supports cross-disciplinary team performance (**Crowston** *et al.*, 2015). Additionally, building a shared organizational climate, where information, credit, and decision-making responsibilities are shared, is to be encouraged, as organizations and teams that lack a culture of sharing are likely to resist change and remain ineffective (**Stokols**; **Misra** *et al.*, 2008).

In an interdisciplinary collaboration, it is important for team members to be able to engage in frequent social gatherings, retreats, and other forms of face-to-face communication. Some studies have noted that face-to-face contact prior to engaging in remote collaboration is critical to establishing some degree of trust at the beginning of a program (**Olson**; **Olson**, 2000). Therefore, it is essential for teams, especially for teams that frequently use telecommuting, to organize diverse activities to increase trust and group identity among members.

4.4.6. Training and education of interdisciplinary collaboration

The magenta cluster in Figure 4 contains keywords such as scientific teamwork, interprofessional collaboration, training, education, team training, research collaboration, mentoring, and readiness. These keywords speak to the training and education factors affecting collaboration in interdisciplinary teams.

Training and educating researchers in SciTS is widely recognized as one of the most effective ways to enhance teamwork skills and team effectiveness. It is also thought to be an important driver for developing SciTS as a field. Training and education in team science can ensure researchers have the knowledge and competencies necessary for successful collaborations and may be particularly helpful in addressing two particular challenges in team science –highly diverse team members and high task interdependence. Conceptually, team training is defined as an intervention to improve team performance by teaching the competencies necessary for effective performance as a team (**Delise** *et al.*, 2010). Interdisciplinary and transdisciplinary education refers to long-term courses to prepare a generation of scholars to solve complex problems in interdisciplinary research environments (*National Research Council*, *NRC*, 2015). Training and education are interwoven, and both aim to prepare for team science.

Researchers have proposed a variety of team science competencies as important learning goals in training and education:

- team knowledge, such as task understanding, shared mental models, and role knowledge;
- team skills, such as communication, assertiveness, and situation assessment;
- team attitudes, such as team orientation, trust, and cohesion (*National Research Council*, *NRC*, 2015).

There are several representative strategies for teaching these three team competencies of knowledge, skills, and attitudes. These include cross-training, team self-correction training, knowledge development training, team coordination training, and team building.

(1) Cross-training is considered to be an effective means of training "interpositional knowledge" (IPK), which can help members of scientific teams develop both knowledges of the roles and competencies of different team members and also the common goals and shared expectations of teams.

(2) Team self-correction training refers to team members being empowered to improve their performance by reflecting on past performance events and self-diagnosing areas for improvement (**Smith-Jentsch** *et al.*, 2008). Team self-correction training, or dimensional team training, is a specific type of self-correction that has been found to improve both taskwork and teamwork performance (**Gurtner** *et al.*, 2007).

(3) Knowledge development training is a way to help scientific teams collaborate to solve problems by improving both knowledge building and knowledge sharing. It has been shown that training in knowledge-building leads to improved knowledge transfers, knowledge interoperability, cognitive congruence, and higher overall team performance with a task (**Rentsch** *et al.*, 2010).

(4) Team coordination training is specifically designed to help teams modify their response strategies to changing environmental conditions in a timely manner. This process-oriented training method helps teams deal with variability in coordination demands. Research has shown that teams trained in "disruptions" or "perturbations" are often able to adapt to stressful situations by using effective coordination strategies. As such, they tend to perform better in their collaborations (**Gorman** *et al.*, 2014).

(5) Team building is perhaps one of the most appropriate training methods for cross-disciplinary teams to improve attitudes. It focuses on improving behaviors and relationships within teams (**Payne**, 2001).

In addition to team training, the knowledge, skills, and attitudes associated with team science can also be enhanced through undergraduate and graduate education. Examples include attending courses, seminars, and workshops taught by interdisciplinary faculty; being mentored by faculty from multiple disciplines; working with others who are interdisciplinary trainees; and joining an institutional environment that supports interdisciplinary research.

4.4.7. Measurement and evaluation of team science

The brown cluster in Figure 4 comprises keywords like evaluation, publication, assessment, research productivity, collective intelligence, innovation, bibliometrics, and citations. The focus of these keywords is, therefore, on the measurement and evaluation of team science.

Increased funding of team science has raised questions within the scientific community about the effectiveness of team approaches relative to more traditional, solo science. This makes it necessary to evaluate whether team science programs have indeed played a significant role in advancing science (**Croyle**, 2012; **Klein**, 2008). The evaluation of team science aims to identify, measure, and understand the processes and outcomes of team collaborations (**Mâsse** *et al.*, 2008), which is the primary way to measure team effectiveness and assess the importance of various factors to team collaboration. Through such evaluations, the potential mediators and moderators of successful team science outcomes can be understood, and lessons can be learned about the investment direction and management tactics that should be implemented for subsequent team science programs.

Evaluating collaborative outcomes is the most common evaluation dimension in team science. Assessors have tended to rely on publication data as metrics of collaborative outcomes. Generally, bibliometric methods are used to evaluate the quantity and quality of the outcomes (**Hall** *et al.*, 2018). In addition, bibliometrics can also be combined with other research methods, such as altmetrics, questionnaires, interviews, and social network analysis, to explore the processes of team science and their relationships to research outcomes. The collaborative outcomes that are generally evaluated include publications, citations, applications, social benefits, innovations, etc. Typically, there is also a focus on exploring which team composition maximizes these measures (**Liu** *et al.*, 2020), as shown in Table 5. However, evaluation processes often need to be conducted in conjunction with the developmental stages of team science programs. For example, it would make sense to evaluate the indicators of collaboration readiness in a near-term assessment, the indicators of translation and innovation in a mid-term assessment, and indicators like societal impact in a long-term assessment (**Hall**; **Feng** *et al.*, 2008).

> Researchers who collaborate across disciplines may face challenges in understanding and integrating perspectives from different disciplines, so creating more team communication platforms and training opportunities are needed

Table 5. The evaluation dimensions of collaborative outcomes

Collaborative outcomes	Description
Publications	Which team composition leads to more publications?
Citations	Which team composition leads to more citations?
Applications	Which team composition leads to more patents?
Quality	Which team composition leads to higher-quality research?
Social benefit	Which team composition leads to higher social benefit?
Innovations	Which team composition leads to the most innovative or disruptive science?

In addition to evaluating these outcomes of team science, the collaborative process itself also needs to be measured, as it is this process that governs the functioning and development of the team. The collaborative process specifically includes how team members interact, communicate, and collaborate with each other. In the process of scientific collaboration, the ability of a team to perform a wide variety of tasks is called collective intelligence, which directly relates to team performance (**Woolley** *et al.*, 2015).

Some studies have found that a team's capacity for collective intelligence is strongly correlated with the average social perceptiveness of team members (i.e., the degree to which each individual collaborates with others) but only moderately correlated to the average or maximum intelligence of the team members (**Woolley** *et al.*, 2010). It has also been suggested that the two factors that influence a team's collective intelligence are team composition (e.g., age, gender, diversity, and skill of members) and team interaction (e.g., structure, processes, and norms) (**Woolley** *et al.*, 2015). In addition, research on team performance has found that team performance and creativity are more related to the social processes of team interaction than individual personality traits (**Cross**; **Love**, 2017). Further, research on team creativity and innovation has found that the three key predictors of team success are team membership, engagement rules, and interaction patterns (**Cross**; **Love**, 2017). Therefore, the collaborative process is an important factor influencing the team's success.

Unlike measuring collaborative outcomes, analyzing collaborative processes generally requires using qualitative methods such as questionnaires and interviews. When measuring the effectiveness of team interactions or exploring the impact of certain factors on team processes, researchers generally take the form of scales to conduct research. For example, F. Martín-Alcázar designed a scale for measuring the social capital of research teams in terms of relational, cognitive, and structural dimensions (**Martín-Alcázar** *et al.*, 2019). It is worth noting that many factors can affect the antecedents, processes, and outcomes of team collaboration and should be considered when evaluating team science.

5. Conclusion and discussion

A dramatic increase in the scale and complexity of science and technology, increasing specialization, and a transition from individual innovation to collaborative discovery have characterized the past century. This shift has been driven by high expectations for "team science", which holds that researchers working in teams will achieve breakthroughs otherwise difficult to attain through individual or simply additive efforts. In this work, we have provided a comprehensive overview of the science of team science (SciTS) by combining a systematic literature review with bibliometric methods. Starting from the related concepts and connotations of the team and team science, we have outlined the important events in the emergence and development of SciTS, discussed its foundational theories, and summarized the characteristics of the literature and its seven main streams of research, which are: the definition and theory of SciTS, team composition and collaboration patterns, team formation and team functioning, the physical environment and culture of teams, institutions and organizations for teams, training and education, and the measurement and evaluation of team science.

Our work reveals that the field of SciTS is growing and evolving, with an increasing number of relevant academic papers, books, tools, and academic conferences. The field is also receiving more and more attention and support from some well-known institutions, such as *NIH*, *Elsevier*, the *U.S. Army Research Office*, and others. However, as an emerging field, SciTS's development inevitably faces challenges and achieves breakthroughs that require urgent attention and study by relevant researchers. We have assembled a list of suggestions that we feel, based on our review, are key to further advancing the field.

1) Focus on theories, methods, and tools for interdisciplinary collaboration, and build mature theoretical and methodological systems describing SciTS. Currently, the SciTS field has not yet established a fully mature theoretical and methodological system and a more mature and recognized disciplinary paradigm. For example, definitions of core terminology and typologies of practice and theory related to SciTS too often remain impressionistic or narrow; methodological approaches are limited; and gaps remain in the translation of theory into team science practice (**Falk-Krzesinski** *et al.*, 2011). Therefore, a mature SciTS theoretical and methodological system is urgently needed.

> SciTS focuses on improving the overall team efficiency and to some extent may overlook the growth of the individual scientist

These systems need to relate to the foundation and future development of SciTS. Considering that SciTS is closely related to scientometrics and the interdisciplinary sciences, it is necessary to integrate theories, methods, tools, and research findings within these two disciplines in the future and combine them with specific research settings to build a theoretical and methodological system of SciTS in which theory and practice are mutually reinforcing.

> The SciTS field has not yet established a fully mature theoretical and methodological system and a more mature and recognized disciplinary paradigm, which require urgent attention and study by relevant scholars

2) Inspire scholars from more countries to participate in SciTS to build a multicultural and multi-stakeholder subject area. The field of SciTS has been developing for nearly two decades since its emergence. For a long time, Western countries have played an important role in the organization and participation of the *International Science of Team Science Conference*. We counted the countries to which the corresponding authors belonged and found that the leading countries of SciTS articles involved only 34 countries. The United States is overwhelmingly dominant in SciTS, while most countries, especially African countries, are rarely engaged in this field. Given that contemporary team science is dominated by the United States, this may raise a risk that large team science organizations or programs will likewise be dominated by people from those countries. Instead, people from other countries may inadvertently crowd out organizations or programs, leading to science that focuses unduly on the preoccupations of a small subset of humanity (**Medin** *et al.*, 2017). Moreover, there may be a "preference" in the funding of projects, thereby increasing the risk of scientific conservatism. To mitigate the risk mentioned above, we call for researchers from more countries to participate in SciTS to bolster underrepresented groups in team science.

3) Investments in team science initiatives need to be strategic, with the flexibility to adjust funding amounts based on evaluation results. Although team science initiatives can help facilitate the solution of complex problems, there are still some skeptical voices. Some scholars argue that team science initiatives consume a great deal of money, human labor, and material resources (**Morgan** *et al.*, 2003), while the value-added contributions to scholarship, training, and public health may not be evident for several decades (**Marks**, 2006; **Weissmann**, 2005). This is because team science initiatives and large-scale collaborative teams often require a good deal of preparation work to get everything organized and functioning well (**Brazil**, 2021). In addition, organizing researchers into collaborative centers or large-scale teams does not necessarily lead to more effective work than working independently or as collaborators in small-scale teams (**Marks**, 2006; **Weissmann**, 2005). Indeed, some research questions may be more appropriately addressed using interdisciplinary approaches, while others can be accomplished more efficiently by smaller-scale, unidisciplinary projects (**Stokols**; **Hall** *et al.*, 2008). Therefore, investments in team science initiatives need to be strategic and should be reserved for those research topics that are best suited to and would benefit most from interdisciplinary collaborative approaches. Public institutions and private foundations must be able to choose to increase, suspend, or terminate their investment efforts in team science initiatives based on evaluation results.

4) Improve talent evaluation and team evaluation mechanisms to mitigate any inequalities that may arise or be exacerbated. When forming interdisciplinary teams to address big societal problems, researchers who are invited to join the teams may benefit more in terms of visibility, received citations, work experience, and networking opportunities than those who are not invited. This may lead to increased inequality among researchers and, on a higher level, among universities (**Liu** *et al.*, 2020). In addition, large-scale team science initiatives or programs are generally dependent on investments by public institutions and private foundations. Hence, teams without investments but with new ideas may be at a natural disadvantage compared to those that are funded. Therefore, it is necessary to improve talent evaluation and team evaluation mechanisms, innovate evaluation methods and evaluation indicators, and increase the scrutiny of program selection and investment, thus helping to alleviate any inequalities that may arise or be exacerbated.

5) Focus on personal growth in teams and customize personalized growth plans. Personal growth in teams has been somewhat neglected. SciTS focuses on understanding and enhancing the conditions, processes, and outcomes of team science, with the goal of improving the overall team effectiveness. Yet, in this endeavor, the growth of the individual scientist often gets overlooked, which is likely to constrain creative thinking, curtail due credit, and undermine career progression. Therefore, understanding how individual scientists learn, progress, and innovate in teams is also urgently needed. One such strategy for cultivating personal growth within a team may be to first make a personal development plan by combining the team's development goals and the individuals' growing needs. Second, train individuals on their professional theoretical knowledge and work skills. Finally, conduct a comprehensive assessment of personal growth and any improvements in ability on a regular basis.

6) Develop more team communication platforms to reduce any bias in understanding caused by interdisciplinary collaboration. Integrating different perspectives within an interdisciplinary team can often be difficult, but members are likely to benefit from a broader range of perspectives, experiences, and expertise. However, researchers in these situations may have problems with language barriers and communication, find it difficult to navigate the different structures or procedures of different institutions and disciplines or find it confronting to understand and integrate different views across

disciplines (Yu *et al.*, 2019). Therefore, a big issue is dealing with the different perspectives of researchers from varied disciplines and ensuring they communicate effectively with each other. When divergent views exist, they may also be accompanied by issues such as team conflict, psychological safety, and role ambiguity. Therefore, more communication platforms need to be developed to facilitate communication and understanding in interdisciplinary collaboration and to accelerate the achievement of team goals.

Limitations

There are several limitations to our work that need to be further considered.

First, the retrieval terms we used to assemble our samples were not comprehensive. In a broad sense, studies related to "team" and "collaboration" can be considered team science research, but such a broad scope makes it more difficult to retrieve and analyze the content. Therefore, we used "team science" as retrieval terms, which are more precise but may mean some relevant works of literature were overlooked. In future studies, we will balance precision with comprehensiveness and prepare a more sophisticated search strategy.

Second, SciTS is an emerging interdisciplinary field in its early stages of development. Its future development directions and research focus are yet to be thoroughly studied. Our suggestions for future areas of research are just that –suggestions. These ideas need to be combined with in-depth discussions with experts across multiple fields to map out a solid future agenda for the field.

In conclusion, we hope that more outstanding scholars can be attracted to join the research in this field. We also hope that research management organizations will pay more attention to the important values and significance behind team science to help jointly promote the orderly development of SciTS.

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Effects of Turkish cultural products on its foreign policy toward Africa: Turkish TV series as an example of soft power in Kenya, Mozambique, and Senegal

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Abstract

Along with other international players such as China, India, or Russia, Turkey decided to increase its economic engagement with Africa starting more than a decade ago, around the time when the current ruling *Justice and Development Party* (*AK Party*) came to power. At the same time, it has been enhancing its soft power by building infrastructure, increasing its military presence, becoming visible in humanitarian aid, and exporting cultural products. This country's penetration and involvement in local African life have been controversial in terms of international politics, and its media products could be one of the essential strategies to change the dominant Western narratives. This research is based on the assertion that, through Turkish TV series, Turkish soft power creates a perception of Turkey in African countries and argues that those that have been aired on that continent have a political effect on people. To achieve the objectives proposed in this study, an in-depth interview method was used to collect data, taking into consideration information, cultural characteristics, and experiences within an ethnographic approach. In this context, we interviewed people who live in Mozambique, Kenya, and Senegal, where relations with Turkey have especially strengthened in the last 10 years, and who regularly watch Turkish TV series. This study asserts that Turkish TV series play an important role in the way Turkey is perceived in the African countries in which they are consumed but also serve, in a positive way, as a key information source regarding the country's image.

Keywords

Turkish series; Cultural industries; Video on demand; VoD; Media geopolitics; Soft power; Colonialism; Cultural diplomacy; Cultural hegemony; Cultural diversity; Tourism.

1. Introduction

Power is the most salient element of international relations, and states are the main actors, owners, and implementers of it. This concept has been one of the most discussed topics in political science from the past to the present day (**Cutler** *et al*., 1999; **Frieden**, 1999; **Waltz**, 2010). Power, which became more important with the advent of the nation-state, has received more attention than other concepts in international relations. With changes and developments in technology and media, different philosophers defined the concept of power differently in each period.

There is a silent war underway for the control of narratives in the global digital ecosystem –a war in which the major technological platforms are using the capitalist logic of accumulating and standardizing content, achieving cultural hegemony, in the words of **Gramsci** (2013) and **Mattelart** (2021). Multinationals such as *Google*, *Apple*, *Facebook*, *Amazon*, and *Microsoft*, known under the acronym GAFAM, can influence users by applying data mining and algorithmic rules (**Zuboff**, 2020).

The geopolitical fringes of the world system seem to have been sidelined according to the conclusions of the report commissioned by *Unesco*, which in the 1980s determined that 80% of the information consumed in the so-called Global South was monopolized by Western countries (**McBride**, 1980). However, the possibilities that opened up with the massive flow of online content and the proliferation of cultural products such as television series and soap operas produced outside of Western paradigms and consumed worldwide would lead to the idea of the "struggle for meaning" that **Hall** (2013, p. 249) talked about. This situation reveals new lines of study in which international relations and the use of cultural diplomacy or soft power together with the analysis of cultural and communication industries provide interesting nuances for the analysis of the geopolitics of media around the world.

Turkey has increased its economic engagement with Africa over the past decade (**Donelli**, 2021). At the same time, it has been enhancing its soft power through the construction of facilities, its military presence, humanitarian aid, and cultural products such as TV series. This country's penetration and involvement in local African life have been controversial in terms of international politics, and its media products could be one of the strategies essential in changing this narrative.

The global impact enjoyed by Turkish TV productions overlapped with Ahmet Davutoglu's appointment as Foreign Minister in 2009 and his new geographical vision. From then on, Turkey has transformed its international presence –which until then had consisted of maintaining a passive role, concentrating its interests exclusively in the United States and Europe– so as to become a key player in the region and disseminate what has been called a pan-Islamist current or a neo-Ottomanism (**Albentosa-Vidal**, 2017).

According to this narrative promoted by Turkish President Recep Tayyip Erdoğan over the past decade, films and TV series produced in Turkey would support the idea of building a new country. These series often show the unity and solidarity of the Ottoman period, as well as Muslim Turkey, but examples are also presented that would highlight values such as heroism, bravery, sacrifice for the nation, or the mythological component of the Muslim religion. This Turkish aspiration to become a political and cultural role model for the Arab Muslim world has been strengthened with the export of Turkish series to the African continent, and translates into obvious economic returns, but above all

> "it would help to spread the image of a liberal and democratic Turkey to the world" (**Tutal-Cheviron**; **Çam**, 2017, p. 7).

The Turkish TV series industry has reached an income level of $350 million and exports to more than 140 countries (*Turkish Ministry of Culture and Tourism*, 2017). Although it is difficult to obtain precise information on which TV series are watched in which countries or the number of consumers of these products, **Karlıdağ** and **Bulut** (2014, p. 76) interpret this success as follows:

> "Short-term return on investment, new communication technologies, Istanbul's inviting atmosphere, sociocultural variables, and their relationship with television series can be evaluated in the context of politics and strategy".

TV series would fall under the umbrella of popular culture (**Nye**, 2004), a concept that varies according to context (**Ryan**; **Kellner**, 1988), for example, that of the implementation of cultural diplomacy (**Schneider**, 2006), media technologies (**Warren**, 2014), media framing practices themselves (**Chong**; **Druckman**, 2007), or the influence of Internet networks (**Zaharna**, 2007). A good example of the application of **Nye**'s argument, which states that soft power is used to achieve an objective through attraction rather than pressure and money, is the role that the Chinese media play on the African continent (**Zhang**; **Wasserman**; **Mano**, 2016; **Madrid-Morales**, 2021; **Ruiz-Cabrera**, 2022).

Turkey has taken second place after the United States in terms of number of television series productions in the world. Turkey would be exporting its own popular culture through these cultural products (Özarslan, 2020). This makes it easier to influence individuals without pressuring them, primarily through products of popular culture. Moreover, the prominence of these Turkish commodities in the world has ever more frequently made them the subject of academic literature (**Kraidy**; **Al-Ghazzi**, 2013; **Yiğit**, 2013; **Yörük**; **Vatikiotis**, 2013; **Karlıdağ**; **Bulut**, 2014; **Balaban**, 2015; **Yesil**, 2015).

As we will show below, Turkey plays a key role on the African continent and is a new player with little presence in academic papers. This study asserts that soft power creates a positive perception through Turkish TV series and argues that they have a political impact on people in the countries where they are broadcast and/or viewed. In addition, this study offers a new approach to the forms of Turkish soft power in Africa through a media perspective.

Kenya, Senegal, and Mozambique have been included in the research as case studies because (i) they have different colonial pasts and linguistic links to their former colonizers; (ii) they function as important regional economic centers in East Africa, West Africa, and Southern Africa; and (iii) they offer a new look at the consumption and dynamics of these Turkish products in Africa. The pur-

> ❛ The global impact enjoyed by Turkish TV productions overlapped with Ahmet Davutoglu's appointment as Foreign Minister in 2009 ❜

pose of this research is therefore to study Turkish TV series released after 2010 in particular in these three countries and what the audiences' perception of Turkey is based on these products.

Thus, the study examines the role of Turkish television series on the African continent:

(i) as a source of information about Turkey

(ii) as creative products of the cultural industry within the framework of international public relations for Turkey

(iii) with the aim of exploring Turkey's constructive role in its soft power

2. Literature review and theoretical background

2.1. Turkey's soft power in Africa

Soft power can be defined as the ability to influence the behavior of others and obtain the desired results. As **Nye**, father of the concept of soft power, comments:

> "The countries that are likely to be more attractive and gain soft power in the information age are those with multiple channels of communication that help to frame issues" (2004, pp. 31-32).

Li (2009) further specifies that soft power refers to culture, values, development models, or presence in international institutions that would place it on the global stage.

In the context of Turkish media presence on the African continent, two narratives could be mentioned: a win-win narrative in which all countries involved would benefit and a public diplomacy narrative (**Börekci**; **Löffler**, 2021, p. 92). In the first of these narratives, there is an overt interpretation in which Turkey intends to differentiate itself from the role played by the former colonial powers. The country boasts of not having a colonial past in Africa and of being a country in the Southern Hemisphere that is part of an imaginary hub from which it could offer alternatives to the Western *modus operandi*. Regarding the latter narrative, in terms of soft power, Turkey appears to be a new player that has been able to position itself in areas in which, for example, China, the major player on the continent, has not been able to achieve legitimacy thus far, such as the military, humanitarian aid, or religion.

With respect to Turkish-African relations, there are three historical stages of note. The first key moment was the 1960s, at a time when many African countries gained independence and Turkey adopted a pro-Western attitude when it came to the process of decolonization. In fact, relations with the countries of the continent often took a back seat (**Tepeciklioğlu** 2012). According to **Ataöv** (1976), while Angola's independence from its colonial power, Portugal, was being voted upon in the *United Nations General Assembly*, the Turkish authorities were instructed to reach a consensus on the vote together with the *NATO* allies who disagreed, and the very independence of Tunisia and Algeria was considered a domestic policy issue for France. Despite this background, the African countries that gained their independence were recognized by Turkey, and diplomatic relations were established (**Hazar**, 2003).

The second stage began in 1998 with the drafting and implementation of the *Africa Action Plan*. The continent began to play a more prominent role in Turkish foreign policy, and measures were included to improve relations with African countries in areas as varied as education, culture, economics, and even the military. The *Justice and Development Party* (*AK Party*), which came to power in the 2002

> Broadcasts of Latin American soap operas had a monopoly in Africa from the 1970s to the 2000s. Since then, other similar products have been created in India, the Philippines, and Turkey

elections, began to pay particular attention to Africa. The countries on this continent are important markets for Turkey; however, Erdoğan also needed to achieve his short-term goals, such as becoming a temporary member of the *UN Security Council*, which he did in 2009, and for that, he needed the support of the African bloc. The *Africa Action Plan* was followed by the *Strategy for the Development of Commercial and Economic Relations with African Countries*, implemented in 2003.

The third stage coincided with the 2005 declaration of the "Year of Africa," which was coupled with Turkey's status as an observer country in the *African Union*. Thereafter, one of the most important milestones in Turkey-Africa relations was the *First Turkey-Africa Cooperation Summit*, held in Istanbul in 2008, in which approximately 50 African countries and representatives of 11 international and regional organizations participated. In the same year, there was an increase in the number of representative offices in African countries. In 2009, there were seven Turkish embassies on the continent, and this number increased to 19 in 2013 in accordance with the *Council of Ministers*' decisions regarding the addition of new embassies and consulates general to Africa. As of January 2023, Turkey had representation in 39 countries, and the national carrier *Turkish Airlines* flew to 36 African nations, some of which had several destinations, as in the case of Nigeria, Egypt, and South Africa.

2.2. Consumption of television media and background of soap operas in Africa

The development of the media sector on the African continent has had three distinct stages. The first coincided with the decade of independence (1960s) in which the first presidents co-opted their power and used it (mainly through the written press and the radio) to cement the political projects of the new countries that were created after decolonization. Therefore, they needed a tool capable of transmitting the ideologies and conceptual frameworks that would define the first years of their legislatures.

The second stage had to do with the consequences of the implementation of structural adjustment plans (SAPs) promoted by major international agencies such as the *International Monetary Fund* (*IMF*) and the *World Bank* (*WB*) (**Bourgault**, 1995; **Hyden** *et al.*, 2007; **Ruiz-Cabrera**, 2018). These SAPs demanded a reduction of state muscle to face the so-called debt crisis incurred after the independence process. Among the required measures was the liberalization of the media, which meant that African states were forced to purchase audiovisual products from companies mainly from Latin America and Asia to make up for the lack of the national content, the creation of which made state budgets more expensive. These products were cheaper and contained everything, including soap operas, Indian productions, and Asian martial arts series (**Biffot**, 2018).

The third stage is the current one, in which two realities coexist: public and private television channels that offer free-to-air entertainment content, and the satellite television companies themselves that have specific channels for soap operas, among which the South African *DSTV Multichoice*, the Chinese *StarTimes*, and the French *Canal+* stand out (**Ruiz-Cabrera**, 2017; **Srnicek**, 2018). The rise of digital media such as paid platforms has led to significant changes in Africa's media landscape (**Conroy-Krutz**; **Koné**, 2020). Although audience and content studies on the African continent are still very scarce, increasing Internet connectivity, a young population, and a growing middle class are factors that indicate that video-on-demand (VoD) subscriptions will reach 13.7 million in 2027, up from 4.89 million at the end of 2021 (**Siele**, 2023). Nevertheless, it is worth considering the context of each country.

In Senegal, for example,

> "Television undoubtedly constitutes the best showcase for the dissemination of fictional films and especially series, which have a growing audience among viewers" (*Unesco*, 2021, p. 203).

In the case of East Africa, a region where distribution and exhibition networks (cinema, television, video on demand) are led by international multinationals such as *MultiChoice*, *StarTimes*, *Netflix*, *Amazon Prime*, *Showmax*, or *Canal+Afrique*,

> "VoD platforms had already attracted a fifth of the Kenyan adult population, in addition to a high consumption of free *YouTube* videos" (*Unesco*, 2021, p. 140).

In the case of Mozambique, the percentage of people who have access to the Internet is 32%, which means that

> "more than two-thirds of Mozambicans still do not have access to the internet and are therefore excluded from the digital world" (**Torgusson**; **Pswarayi-Riddihough**, 2022).

It is specifically in the second of the historical stages described above when soap opera broadcasts were introduced on the African continent, and from the 1970s until the 2000s, they had a ubiquitous reach. As the new millennium began, other similar products created in India, the Philippines, and Turkey –which would be more in line with the realities of African audiences and would have even more of a religious focus– emerged (**Jedlowski**; **Rêgo**, 2018, p. 2). As different authors have pointed out (**Larkin**, 1997; 2003; **Adamu**, 2007; **Barlet**, 2010; **Fair**, 2010; **Krings**, 2015; **Banda**, 2009; **Stern**, 2009; **Gagliardone**, 2013; **Zhang**; **Wasserman**; **Mano**, 2016; **Jedlowski**; **Röschenthaler**, 2017), many local producers have found a pattern of success in the production of series since the advent of digital video, not only because of their esthetics and scripts but also because it is a relatively sound business model in itself.

Case studies about soap operas on the African continent are varied; however, the technological development that the media sector and, more specifically, the ecosystem of video-on-demand platforms has undergone since 2010 has led to the current proliferation of private channels specialized in the broadcasting of series and soap operas where they adapt the local situation to the demands of the population. For example, producers in African countries have established agreements with Latin American companies for new adaptations (**De-La-Fuente**, 2015), with Brazilian companies for the Lusophone sphere of influence (Angola, Cape Verde, Guinea Bissau, and Mozambique) where these productions can be seen at any time of day (**Kone**, 2017), or for reruns dubbed into local African languages; for example, in Ghana between July 2016 and April 2017, the Mexican telenovela *Simplemente María* [*Simply Maria*] was dubbed into the Twi language (**Tindi**; **Ayiku**, 2018).

Jedlowski and **Rêgo** explain that the distribution mechanisms of cultural products such as Turkish TV series in Africa would have a political dimension. They indicate that

> "these productions are particularly successful among African audiences, not because they are able to offer a model of modernity parallel to the West, but on the other hand, they represent a fantasy world of modern consumerism, an ideal world that creates value from its cultural specificities" (2018, p. 8).

This point is disputed by **Anaz** and **Ozcan** by establishing a link between Arab tourism in Turkey and the consumption of Turkish series as they

> "are supposed to juxtapose European modernity and Islamic values" (2016, p. 254).

Tinas (2020), with an analysis of the role played by the historical series produced in Turkey and their effects on the audience, or **Beurazek** (2022), with a case study in Algeria, have stressed the idea that these entertainment products contain a high degree of political propaganda.

Finally, this article's case study would provide two interpretations, as proposed by **Rafi** (2020, pp. 205-206): to accept, on the one hand, that Turkish series reflect a cultural hybridization since they emanate from a standardized model and,

on the other hand, that they are creations that cannot be compared with soap operas from other regions, since they have particular characteristics according to their broadcasting context. **Ruiz-Cabrera** (2022, p. 166) qualifies that this Turkish format would promote the country's brand and subliminally indoctrinate content that, in some cases, deals with subjects that are taboo in many countries where they are screened.

2.3. Kenya, Senegal, and Mozambique's connection to the Turkish presence in Africa

In the entire East African region, Kenya has established itself as one of the priority countries for many of the international players with a presence in Africa, such as China and Turkey. For Turkey, which is led by Erdoğan, Kenya is an economic and geopolitical magnet. According to the latest figures from the *Turkish Ministry of Foreign Affairs* (2023), the volume of bilateral trade between the two countries has continued to increase in recent years, rising from $234 million in 2019 to $251 million in 2020.

Statements made by Cemil Miroglu, Turkey's ambassador to Kenya, on the 55th anniversary of diplomatic relations between the two countries, the oldest Turkish diplomatic mission in Africa, confirmed that by 2021 the economic figures had risen to $350 million (**Ngetich**, 2022). In addition to the presence of the *Turkish International Cooperation and Coordination Agency* (*TIKA*) in health, food, agriculture, livestock, and education projects, 310 scholarships have been awarded to Kenyan students from 1992 to the present.

Mozambique is a country in which both China and Russia have a more predominant presence than Turkey; despite this, the economic figures, with little impact on the media, show how the two nations maintain a progressive and strong relationship, especially since January 15, 2011, the date when an embassy opened in Maputo, the Mozambican capital. In April 2019, the first bilateral political round took place, and according to the latest economic data provided by the Turkish Foreign Ministry, revenues increased from $115 million in 2016 to $153 million in 2019. Sixty student scholarships have also been awarded since 1992.

Last, Senegal witnessed how Turkish soft power can be translated into infrastructure by imitating the Chinese model that has worked so well for Beijing and applying it to the African continent. In less than a decade, the Turkish company *Summa-Limak* has built the *Abdou Diouf International Congress Center*, a luxury hotel managed by the international company *Radisson*, a sports center (*Dakar Arena*), an exhibition center, and most recently, the *Abdoulaye Wade* soccer stadium, the inauguration of which Erdoğan himself attended on February 22, 2022 –his fifth official visit to Senegal since 2013 (**Du-Couëdic**, 2022). *Blaise Diagne International Airport*, located less than an hour from Dakar, was also completed at the end of 2017. Likewise, in February 2022, the presidents of Senegal and Turkey showed their good relations within the context of the Senegal–Turkey business forum organized in Dakar. In Erdoğan's words, the goal is to reach $1 billion in the next few years.

3. Methodology and objective of the study

This study analyzes Turkish TV series as a tool of the soft power that Turkey has used in Kenya, Senegal, and Mozambique, especially since 2010. The main objectives of the study are threefold:

- first, to determine where the interviewees stand when it comes to the values that were imposed by their former European colonizers (France, England, and Portugal) and with respect to the Turkish culture to which they are exposed through these cultural products;
- second, to analyze how they perceive Turkish culture; and
- third, to identify how they perceive Turkey.

In this sense, the focus of the study is in line with these research questions:

RQ1: What role do Turkish TV series play in building Turkey's soft power?

RQ2: How does the fact that African audiences watch Turkish TV series affect their perception of Turkey?

RQ3: Do Turkish TV series act as a source of information on the African continent?

This study uses a qualitative research method: the in-depth interview. Depending on the nature of the design, the interviewee may be the source from which all or most of the data are obtained, or the individual may be one of the units in the data collection process (**Boyce**; **Neale**, 2006; **Gürkan**, 2019). In this context, the focused/semistructured interview technique was used, and an attempt was made to gather information about the respondents' thoughts on the target topic. In-depth interviews were conducted with five respondents in each of the three countries selected, forming a corpus of 15 people who were required to meet the following criteria:

(i) They had actively followed Turkish TV series produced in the last 10 years.

(ii) They had watched more than one Turkish TV series.

(iii) To ensure that the respondents were as representative an audience as possible, various public and private entities were contacted to obtain their collaboration.

The interviewees represented a diverse demographic sample: all interviewees lived in the capitals of the countries analyzed, which are Dakar (Senegal), Nairobi (Kenya), and Maputo (Mozambique); all are graduates (15), of which there are postgraduate students (4) and master's students (2); from a professional perspective, there are staff from public administration (4), education (3), media (2), public relations (1), the cultural sector (1), and full-time students (4).

The researchers of this study are aware that the sample is not representative of the universe, so the findings can be generalized to only a part of the international audience. However, considering that there are similar demographic characteristics (Table 3), those who chose to view content based on the "cultural proximity" hypothesis (**Wagner**; **Kraidy**, 2023) showed similar interest in terms of the content of television series and can make similar inferences.

Given that the respondents were interviewed in depth, it is clear that the study had some limitations over the course of the research, and contacting people in all three countries, as well as obtaining their responses, can be cited as the main reasons for the limited sample size. However, these qualitative interviews provided detailed, in-depth, and rich information about the target group. With this approach, the researchers attempted to provide insight into what the selected individuals thought and understood about Turkish culture through popular television series.

Table 1. Questions asked to the respondents

1. On which platform do you watch Turkish TV series?
2. What is/are your favorite Turkish TV series? Who are your favorite characters?
3. Why do you like Turkish TV series?
4. What is the first thing that comes to mind when you think of Turkey?/Could you explain this idea before and after watching the series?
5. Have you been to Turkey? If you haven't been there yet, would you like to visit the country? Why?
6. Are there any details in these series that you find exciting, surprising, or interesting?
7. Has your perception of Turkey changed owing to Turkish TV series?

4. Data analysis

This study proposes that soft power has substantially impacted the perception of Turkey that citizens in African countries have through Turkish television series and, in turn, that television series broadcast on the continent in the last decade have had a political impact on people. An in-depth interview method was used to collect data, taking into account information, cultural characteristics, and experiences within the framework of an ethnographic approach.

In this context, the researchers used text analysis to arrive at the core understanding that includes deeper hidden aspects of meaning by addressing the relevant parts of the statements shared by the respondents (**Downe-Wamboldt**, 1992). To this point, the analysis was carried out in multiple steps without defined categories (**Krippendorff**, 2004):

I. Interviews were transcribed from English, French, and Portuguese, and notes were taken to understand the deeper hidden meaning of the statements shared by the respondents.

II. Once the text was prepared, it was divided into units of meaning and labeled with codes. Finally, the units of meaning were summarized by dividing them into seven themes (Table 2).

The research sample is not representative of the universe; however, reaching out to people from different countries in Africa was essential to see the similarity of experiences in people facing the same problems. Therefore, the semistructured interview used in the research allowed all respondents, upon answering the same basic questions, to share detailed information about Turkish TV series. Interviews with respondents were conducted between December 2022 and January 2023.

The stages of the research were as follows:

(i) conceptualize the relationship between soft power, international relations, media, and persuasion;

(ii) identify the 15 respondents, and complete the interviews with open-ended responses; and

(iii) discuss the results.

The study coded respondents from the African countries as follows: Mozambique: M1, M2, M3, M4, and M5; Kenya: K1, K2, K3, K4, and K5; and Senegal: S1, S2, S3, S4, and S5 (Table 3).

Table 2. Coding derived from the questions

Coding derived from the questions	The main objective to be achieved
Platforms followed	Understand which platforms they prefer to watch the TV series on
Favorite Turkish TV series and characters	Understand what their favorite TV series and characters are and understand their impact on their perceptions of Turkey
Reasons for this choice	Understand the reasons for watching the TV series and their effect on their thoughts about Turkey
Idea of Turkey	Understand their idea about Turkey
Interest in visiting Turkey	Understand the impact that Turkish TV series have on the audience in the selected countries
Interesting events in the series	Understand what issues and topics affect the audience in the selected African countries
The series' effects	Understand the impact on the perception of Turkey that the selected African audience has

Table 3. Demographic characteristics of respondents

Code	Country	Sex	Age	Education	Labor sector
M1	Mozambique	M	31	Bachelor's degree	Public administration
M2	Mozambique	F	45	Bachelor's degree	Education
M3	Mozambique	F	29	Bachelor's degree	Public relations
M4	Mozambique	M	30	Bachelor's degree	Media/audiovisual
M5	Mozambique	F	27	Bachelor's degree	Public administration
K1	Kenya	M	35	Master's Degree	Education
K2	Kenya	F	29	Master's student	Student
K3	Kenya	F	35	Master's Degree	Education
K4	Kenya	M	27	Bachelor's degree	Media/audiovisual
K5	Kenya	M	39	Master's student	Cultural sector
S1	Senegal	F	27	Master's student	Student
S2	Senegal	F	19	Bachelor's degree	Student
S3	Senegal	F	31	Master's student	Public administration
S4	Senegal	M	23	Bachelor's degree	Student
S5	Senegal	M	30	Bachelor's degree	Public administration

5. Results and discussion

The study included eight women and seven men, all of whom were over 18 years of age, and they had a variety of occupations. Convenience sampling is a nonrandom method in which the sample that will be selected from the core mass is determined at the discretion of the researcher. In this technique, population data are collected in the easiest, quickest, and most economical way (**Malhotra**, 2004, p. 321). As a result of the questions asked and the interviews, it is possible to analyze the following topics within the framework:

     i. Viewing platforms
     ii. Favorite Turkish TV series and characters
     iii. Reasons for choosing the series
     iv. Perceptions of Turkey
     v. Interest in visiting Turkey
     vi. Interesting events in the series
     vii. Possible effects of the series

5.1. Viewing platforms

When respondents were asked which platforms they watched TV series on, Mozambican respondents stated that they watched them in different spaces, including national TV channels and the digital platform *Netflix*. M1's response to this question was

> "*Netflix* and Mozambique's national TV channel",

whereas M2 and M3 responded that they watch them on Mozambique's national TV channel. M5 remarked,

> "I am very proud that my government broadcasts other non-Western content for free on the national channel."

The fact that Turkish TV series are broadcast on a country's national channels shows that the local population continuously and systematically demands this content. On the other hand, it is possible that this is a direct consequence of the continuing lack of Internet connectivity and the low penetration of digital payment platforms in this country.

In contrast, in Kenya, whereas participant K1 claimed that he preferred to watch Turkish series on the platform *Netflix*, K2 shared that she did so on *YouTube*. K3 and K5 consumed these products on the South African digital channel *DSTV* and the Chinese *Star Times*, respectively, and K4 stated that he watched these series on *Netflix*, *YouTube*, and some *Facebook* posts. In addition, K1 noted,

> "I love watching Turkish TV series on *Netflix*."

In Senegal, all respondents from S1 to S5 had one thing in common: They consumed Turkish TV series through *Netflix* and *YouTube*. S3 explained,

> "my group of friends paid for a *Netflix* subscription to watch international series",

and S4 stated,

> "These new Turkish series are really cool, and I'm subscribed to the 'Des séries turquoise' ['The Turkish Series'] channel so I don't miss the latest updates."

From the answers collected for this question, it can be demonstrated that Turkish TV series are accessible and popular on the various platforms such as video on demand, social networks, private channels, or state-run broadcasters. This information would coincide with the current content consumption trends for audiences in Senegal, Kenya, and Mozambique as reflected in the literature review (**Conroy-Krutz**; **Koné**, 2020; *Unesco*, 2021; **Torgussonidah**; **Pswarayi-Riddihough**, 2022; **Siele**, 2023).

> 'The ecosystem of video-on-demand platforms that has existed since 2010 has led to the current proliferation of private channels specialized in the broadcasting of series and soap operas where they adapt the local situation to the demands of the population,

5.2. Favorite Turkish TV series and characters

Respondents gave a variety of answers when asked what their favorite Turkish series were and provided numerous titles of these products, as well as the names of the characters in them.

M1 indicated that his favorite Turkish TV series was *Mrs. Fazilet and her daughters*, and his favorite characters were "Afra Saraçoğlu and Ece Çamkıran Egemen." M2 mentioned the names of more than 10 series with the detailed descriptions of the characters, whereas M5 said that she loved

> "the actress Peris in *Ethos*, and lead actress Burcu Biricik from *Fatma*."

Comments from Kenyan respondents were also mixed. Whereas K1 indicated that his favorite series was *Diriliş Ertuğrul* [*Resurrection: Ertuğrul*] and his favorite character was Osman, K2 stated that her favorite series was *Sol Yanım* [*My Left Side*] and her favorite characters were Serra and Salim. As their input elucidates, Kenyan respondents watched a wide range of Turkish TV series with romantic, political, or science fiction themes, a dynamic that we believe would increase their interest in Turkey.

In Senegal, the similarity in cultural and religious values is an interesting point to note. S1 and S3 agreed:

> "I love *Pleine Lune* [*Full Moon*], and *La Mariée d'Istanbul* [*The Bride of Istanbul*]."

S2 pointed out that

> "*Diriliş: Ertuğrul* [*Resurrection: Ertuğrul*] is an incredible take on the Ottoman Empire that I had never heard of before."

S5 loved *Bir Baskadir* [*Ethos*]

> "because it presents a country where the conservatism of the Islamized peoples and the modernity of cities such as Dakar, our capital, coexist. Tradition and modernity on the big screen."

The fact that all respondents referenced many Turkish TV series and characters in their detailed responses seems to indicate that the African audience is familiar with Turkish TV series as well as Turkish names.

5.3. Reasons for choosing the series

When respondents were asked about their reasons for watching Turkish TV series, they gave comprehensive answers about the characters, the stories, and the local components. M1 reasoned that the series are based on real-life stories that preserve culture and transmit cultural information from one generation to the next. M2 expressed her thoughts as follows:

> "First of all, I have to say that I love Brazilian TV series. What saddens me is that they always have the same ending no matter what, so you know what the outcome will be before they end... However, in contrast, the situation is different in Turkish TV series! They always keep you guessing until the last minute, which is exciting for me."

M3 claimed that, in general, mainstream movies and TV series use female sexuality, but this is not the case with Turkish series, and M5 said,

> "I watch Turkish series to learn about the social phenomena prevalent in Turkish society."

The reasons why Kenyan respondents preferred these products also varied. According to the Kenyan respondents, these narratives have the power to be a meaningful addition and to act as an educational tool. We can conclude that these series have a positive effect on audience development. For example, K2 indicated that

> "The plot of the series is very captivating. Turkish series have a way of getting viewers to end up hooked on this fantasy world."

On the other hand, the comments from K3 and K4 were very similar, stating:

> "They are very educational and entertaining."

K5 noted,

> "The Turkish series is a magnificent bundle of drama, music, and acting."

On the western side of the continent, it seems that Senegalese respondents may feel more affinity with Turkish soap operas owing to links to Islam, according to responses provided by S1, S3, S4, and S5. S1 noted that

> "the religious and cultural similarity between Senegal and Turkey is the main motive that make me want to watch Turkish series",

and S3 said,

> "because I want to learn about the customs, traditions, and lifestyle of Turkish society."

S2, the youngest respondent from Senegal, explained that she watched these series

> "to discover Turkish places and landscapes."

It seems like an interesting idea that some respondents did not claim to have been drawn to Turkish series specifically because they are Turkish. That is, if there is a preexisting affinity that helps this consumption along, some of the respondents were not aware of it. However, the technical and cultural characteristics and the plots or the themes themselves did seem to be causes of these productions' success. For other respondents, however, curiosity or affinity with Turkish culture seemed to be the primary motive. This could indicate that the interest in audiovisual productions can act in two ways: as a tool of soft power and as a consequence of it.

> In Senegal, in addition to providing a proliferation of series, Turkey has built several facilities, such as cultural and exhibition centers, soccer stadiums, and the country's new airport, in less than a decade

5.4. Perceptions about Turkey

Respondents gave a variety of answers about Turkey and Turkish culture. For example, M1 responded that the first thing that came to mind about Turkey was the racial context. According to him, in a society in which white people are in the majority, there is class privilege:

> "I think anyone can be rich because they're predominantly white."

M2 answered this question by saying

> "It is a country with beautiful cities. The culinary culture is vibrant and diverse."

Meanwhile, M3 summarized her response as follows:

> "Delicate fabrics, beautiful landscapes, scents and aromas."

Finally, M4 stated that, when people talk about Turkey, they think of its cultural and historical richness and of a tourist spot.

Comments from Kenyan respondents had various and compelling responses, including creativity, fashion, shopping malls, and a life of leisure. For example, K1 pointed out that

> "Before you may think that Turkey has series that are broadcast all over the world, it is a country where there is a lot of creativity and fashion, but certainly after the series, it makes it a certainty that some characters are real."

In contrast, K2 commented,

> "The first thing that comes to mind about Turkey is that it is a wonderful shopping destination. After seeing these Turkish products, I feel it is a beautiful country to visit for touristic purposes."

On the other hand, K3 stated,

> "Fashion... After watching the series, I still see Turks as fashionable people."

In Senegal, S2 and S3 had similar responses: Whereas S2 explained,

> "my view of Turkey and Turks in general changed after watching their series...",

S3 said,

> "watching Turkish series enriches knowledge and cultural balance regarding Turkey in general."

The rich culinary culture was something that S5 emphasized:

> "I think Turks are passionate about food. Maybe we'll have to trade traditional French food for Mediterranean food."

S4 was surprised by the effect that these series had had on his life:

> "Before watching Turkish series I thought Turks were very conservative, but I admit that now I have a good idea of its people's personality."

Based on the respondents' answers, the Turkish series would depict a successful Turkey with upper-middle class people and beautiful landscapes and cities, and would highlight some Turkish cultural characteristics such as gastronomy and hospitality.

5.5. Interest in visiting Turkey

When respondents were asked if they had been to Turkey or if they would like to visit the country after watching these series and why, M1 said that he had not yet visited but would like to very much:

> "Because as a neighboring country, I want to see the differences between Turkey and China and other countries, the value of being able to live there and know the Turkish culture."

M2 noted,

> "I would love to visit Turkey to admire its landscapes, taste the food, and see the clothing styles; I want to dance and meet some actors there."

M3, on the other hand, stated that she had not yet visited Turkey but that she wanted to check out its stores, its shopping malls, and the different cities. In addition, she stated that she wanted to listen to Turkish music and experience the culinary culture. M5 knew that she was interested because

> "after the Covid-19 pandemic, I looked at airline tickets to travel to Istanbul."

The comments of the Kenyan respondents were similar to those of the Mozambicans. K1 and K2 stated that they had never been to Turkey but found the country charming, and they added that they identified with the characters and felt as if they were there while watching the series. This idea of identity is the backbone of these types of productions, and therefore, the producers try to make the audience see themselves while watching the scenes on the screen. K3, in this regard, stated that she had not yet visited Turkey, but that she wanted to go and was particularly curious about its culture. K4's commented,

> "I'd be happier than ever before... I would like to travel to Turkey, meet the major series producers, pick up good filming skills, meet new business-minded people, and learn something about the experience of Turkish life."

From K4's understanding, Turkey is also an epicenter for the audiovisual world. In addition, K5 explained,

> "I have never been to Turkey, but I would love to go and visit because I think Turkey is a country rich in culture, architecture, delicious delicacies, and beautiful scenery, and it is a shopper's delight."

In the Senegalese responses, soft power's role in promoting another image of Turkey is a crucial point. S1 and S5 explained that these products have played an important role in the dissemination of Turkish culture in Senegal. S3 notes,

> "honestly, I had always thought of Turkey as a country under construction, with a lot of poverty and not much cultural interest. I know it was pure ignorance since no one ever told us about this country in school or in the media. Now, however, I'm looking forward to going."

S4 finished his response by saying that

> "Turkish series encourage the viewer to learn the Turkish language because it is a mixture of French and Arabic sounds."

These respondents' comments revealed that Turkish cultural and consumer characteristics –such as daily life, shopping, and food or drinks– are prominent elements in these series and that the audience is influenced by them –factors already mentioned in the literature review by authors such as **Balaban** (2015), **Ağırseven** and **Örki** (2017), **Zafer**, **Göksu**, and **Yavaşgel** (2018), **Larcher** (2019), **Rafi** (2020), **Tinas** (2020), and **Beurazek** (2022).

> ❝ The distribution mechanisms of cultural products such as Turkish TV series in Africa would have a political dimension ❞

5.6. Interesting events in the series

When the respondents were asked whether there were any details in the Turkish TV series that attracted them and that they found interesting, the responses were as follows: M1 said,

> "yes, women hope to be rich someday and set forth their children to spend more time without seeing the clergy, which is exciting to me."

M2 noted,

> "The thrilling endings of Turkish dramas made me give up Brazilian TV series, which are always shocking. We don't find objectified women in Turkish series."

M4 stated that historical places and buildings in particular were fascinating, and M5 mentioned,

> "*Hot Skull* took over my life for weeks. I was talking to friends about the consequences of Covid-19 and the dystopian world of this series."

Meanwhile, the scenes and themes that Kenyan respondents find different and exciting also varied. For example, K1 emphasized that he identifies with the characters and narratives. K2 similarly commented,

> "It's exciting to see how the series portrays people's normal lives, how rich and poor people fall in love, how people use their beauty to attract rich men and the typical love triangle overlaid with jealousy on campuses."

K2's interpretation shows that these narratives construct an exaggerated Turkish dream. K3 responded,

> "betrayal in the business organization",

which shows how the business world is presented in an archetypal way and affects the audience. K4 commented,

> "I still wonder where the producers get those incredible skills and viewpoints."

K5 stated that he found the family relationships in these series very interesting, noting the cozy breakfasts and dinners.

Interviewees from Senegal also responded with a variety of exciting events. For example, S1 and S4 explained the importance of humor in the script. S4 said,

> "I think we need more good vibes in the world, and this is the way to change that."

In addition, S3 stressed the importance of food when discussing serious topics.

> "I guess this is a Mediterranean tradition. Conversation and fun around food. However, for many years this idea came to us only through Hollywood and French cinema films, and I thought that Turkey, as a Muslim country, was removed from that."

S2 thanked these Turkish products for providing a glimpse of the other side of the world, and S5 also mentioned it:

> "*Fatmagül*'ün Suçu Ne? [*What Is Fatmagul's Fault*?] shows the place in society of woman who fights against a taboo such as forced marriage in my country. This is great!."

These comments show that Turkey has become a center of attraction thanks to Turkish series through the use of specific motifs such as their countering of the dominant narrative created by the West or the representations of cities, the characters themselves, or everyday life.

5.7. Possible effects of the series

Finally, respondents were asked whether their perceptions of Turkey had changed after watching these series. M1 and M5 stated that their thoughts had changed because they used to think of Turkey as a poorer country, but after seeing these products, they began to think that economically it was more important. M2 shared,

> "I didn't think of Turkey as a country with such a rich culture, but my opinion changed completely thanks to the TV series."

> ' The fact that all respondents referenced many Turkish TV series and characters in their detailed responses indicates that a part of the audience in the African countries analyzed is familiar with Turkish TV series, as well as with the names of Turkish characters and places '

M3 stated that the series had had a positive effect on her view of the country, and M4 made similar comments, stating that his perception of Turkey had changed for the better and that he had not known the country had so much historical richness.

Comments from Kenyan respondents on this topic are as follows: K1 stated that Turkey is the best producer of soap operas in the world and that everything he saw in TV series was attractive. K2, on the other hand, said:

> "Not really... But the series has improved the beautiful image I already had of the country."

Similarly, K3 described Turkey as an

> "ideal place to live."

K4 said,

> "I find the country incredible, capable, unique."

Finally, K5 stated that he had favorable opinions about Turkey before watching its series, but this image had become even more positive.

From Senegal, S5 gave an interesting response:

> "I believe that watching these series spreads tolerance and honesty among members of society."

In this regard, S2 also mentioned that she changed her perception of Turkey and said,

> "it makes you pay more attention to family relationships."

S4 claimed that, after having experience in urban planning, he

> "could not believe Turkey's richness when it came to modern buildings and cities."

S1 stated that these series promoted the commercial part of the country, and S3 said,

> "I don't know much about international politics, but I am sure that these cultural products, of which I love, are helping to change the idea of the Turkish people in Senegal. We have many buildings in the capital built by Turkey, so the series will help them change the Senegalese's perception."

Comments from these respondents showed that Turkish TV series have positively changed and that they have created new perceptions about topics such as music, fashion, cuisine, daily life, architecture, and consumer habits.

> The broadcasting of this Turkish content, in particular on Mozambican national channels, would imply Mozambique's affinity toward Turkey

6. Conclusions

This research analyzed the role of Turkish television series in three African countries –as a source of information about Turkey, as products of the creative cultural industry that can be evaluated in the framework of international public relations, and in building Turkey's soft power. By focusing on Senegal, Kenya, and Mozambique, this study has expanded the insight into the new consumption dynamics of these Sub-Saharan African societies. There were three main characteristics that defined these trends: the change in perception experienced by viewers after viewing, the positive outlook on the sociocultural and spiritual reality of Turkey, and the preference for choosing this country as a possible tourist destination.

This study has focused on African audiences, exploring their perceptions of Turkish history and culture. In the first research questions, it aimed to reveal whether Turkish-produced series are used as an element of soft power in the countries analyzed. The fact that these audiovisual productions had attracted the attention of the interviewed audience revealed that they can be a good resource to entertain, educate, and inform about historical or cultural elements. In the case of Mozambique, the series can be seen on national television, suggesting the government's affinity for the country ruled by Erdoğan. It is clear that there is a relationship between the existence of Turkish foreign policy and the consumption of the series, and that the series build a positive image of Turkey in Senegal, Kenya, and Mozambique as part of its soft power.

The second research question was intended to reveal whether or not Africans' perceptions changed owing to watching Turkish television series. Respondents who stated that they admired Turkish culture also demonstrated a mastery of the names of the main characters or cities that appeared on the screen. It is interesting to note that none of the countries analyzed had had a previous historical relationship with this content, as has traditionally occurred with the audiovisual products exported by the former colonial powers France, England, and Portugal, or with the countries producing telenovelas in Latin America. It is clear that there is a favorable bias toward Turkey, as emphasized by the Mozambican and Kenyan respondents.

The third research question aimed to determine whether Turkish television series acted as a source of information on the African continent, and it has been observed that this content was essential in promoting Turkish culture, customs, and traditions among African viewers. Finally, the study summarized that the image of Turkey shown in these African countries, analyzed through the series, positively emphasized Turkey's historical and religious ties, its traditional component, a sense of nostalgia, its cultural identity, its scenic beauty, and the dynamism of its business world.

> Turkish TV series have positively changed the view of African consumers and have created new perceptions about topics such as music, fashion, cuisine, daily life, architecture, and consumer habits

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The bibliometric journey towards technological and social change: A review of current challenges and issues

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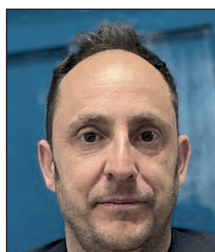
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Abstract

The current trends and challenges in the field of bibliometrics are reviewed. To do so, we take the reader along a bibliometric route with six stations: the explosion of databases, the inflation of metrics, its relationship to Data Science, searching for meaning, evaluative bibliometrics, and diversity and profession. This evaluation encompasses three dimensions of the bibliometrics field regarding research evaluation: the technological, the theoretical, and the social. Finally, we advocate for the principles of an evaluative bibliometrics, balancing the power of metrics with expert judgment and science policy.

Keywords

Evaluative bibliometrics; Research evaluation; Peer review; Trends; Metrics; Scientific databases; Bibliometric indicators; Evolution.

1. Introduction

90 years ago now, Ortega y Gasset proposed the creation of a "Statistics of Ideas" (**Ortega y Gasset**, 2005) in order to

> "determine strictly the chronological moment at which an idea sprouted, the process of its expansion, its exact duration as a collective belief and then the hour of its decline".[1]

In doing so, he foresaw the governing principles of bibliometrics, which is nowadays defined as

> "the quantitative analysis of published [scholarly] literature, notably journal articles and the network of their bibliographic connections" (**De-Bellis**, 2009).

By specifying "published literature" the definition covers all types of documents (present and future, digital or printed) and does not renounce its essential object: despite the views of its most voracious critics, bibliometrics largely continues to be the art of counting articles in journals.

Due to its definitions and the nature of its very history, bibliometrics has been shaped by the evolution of technology and scientific communication habits, with its past being characterized by the monopoly of a single citation index dating back to the 1950s, *Web of Science*. From the 1990s onwards, the irruption of the internet marked the beginning of the search for new horizons, with new alternative proposals to the use of papers and their citations such as webometrics (**Björne-born**; **Ingwersen**, 2001) and usage metrics (**Bollen** *et al.*, 2005). This movement gained pace in 2004 and 2005 with the emergence of *Google Scholar* and *Scopus* and subscription-based document citation services such as the *Book Citation Index* (**Torres-Salinas** *et al.*, 2012) and the *Data Citation Index* (**Robinson-García**; **Jiménez-Contreras**; **Torres-Salinas**, 2016). Around the same time, the concept of altmetrics was developed, which introduced the possibility of analyzing all kinds of digital artifacts through the most singular indicators (**Priem** *et al.*, 2010).

In view of the above, it is undeniably an area in expansion and it is therefore not surprising that some of its leading figures such as **Cronin** (2013) and **Moed** (2017) have advocated broadening its epistemological domains. In a previous paper (**Robinson-García**; **Repiso**; **Torres-Salinas**, 2018) we already pointed out some of the changes that needed to be addressed in the world of scientific assessment, including the explosion in the number of information sources and metrics and the current process of complete immersion in the data science paradigm. Five years on, this proposal has fallen short due to the demands and social sensitivities arisen and accelerated in the aftermath of the pandemic. Terms such as diversity or equity are now included in the policy discourse along with open science or responsible research. Hence, it is time to for an update which reflects current trends and aligns with this post-pandemic reality. It is now a good time to draw up a new map of the bibliometric territory with all its highways and byways. Accordingly, the aim of this paper is to present an overview of our current personal vision of the major issues and challenges facing the world of metrics.
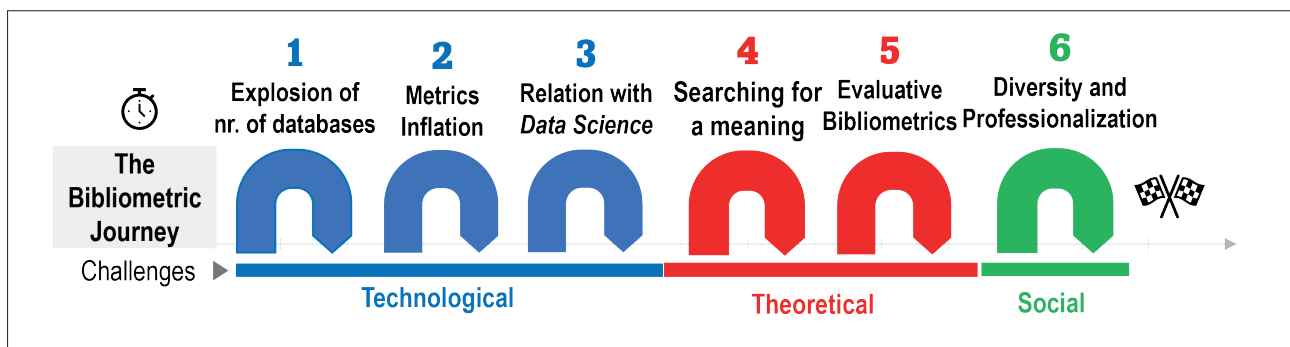

Figure 1. The bibliometric route towards technological and social change

The resulting "Bibliometric route towards technological and social change" is made up of six-way stations grouped into three different dimensions (Figure 1). The review undertaken is also structured along these same lines. Firstly, we deal with the technological dimension by focusing on the explosion of information sources (Fig. 1, 1) and indicators (Fig.1, 2) a situation that is leading to increasing reliance upon data science (Fig.1, 3). Secondly, in the theoretical dimension we consider the need to agree on an interpretative framework regarding the meaning of indicators (Fig.1, 4) and the unquestionable importance of evaluative bibliometrics (Fig.1, 5). Finally, we conclude by pointing to the need for awareness of current social challenges, including a greater focus on diversity and higher levels of professionalization (Fig. 1, 6). Let the journey begin!

2. The bibliometric route

2.1. The explosion of databases

Until recently, databases for bibliometric purposes were rare and the scientific community had very precise knowledge of their limitations and uses. Today, the situation is quite the opposite. The massive creation of digital resources has generated endless options and we have neither the time nor the resources to characterize them in depth (for a more

detailed account, see **Visser**; **Van-Eck**; **Waltman**, 2021). There is also much greater diversity: from a global perspective we have the ever-expanding bibliographic universes of Web of Science and Scopus focusing on scientific journals, along with their respective suites *In-Cites* and *Scival*. On the other hand, there are also academic search engines such as the now-defunct *Microsoft Academic Search* (*MAS*) and *Google Scholar*, which while touted as revolutionary (**Orduña-Malea** *et al.*, 2016), has not made such an major impact.

In addition to these 'classic' products, national solutions also exist such as *Dialnet* (**Mateo**, 2015) or Latin American alternative such as *Scielo* and *Redalyc*. These initiatives with a strong geographic-linguistic component have helped to ensure coverage of local research, as well as doing so in an open and altruistic manner. Despite the dominance of the main corporate databases, more and more open sources are emerging in the Global North as well. Examples of this trend include *CrossRef*, preprint repositories such as *PubMedCentral* and *arXiv*, scientific data sources such as *FigShare* and *Datacite* and digital library catalogues such as *WorldCat*. Mention should also be made of products focusing on identifiers such as *ORCID* at an individual level, (**Costas**; **Corona**; **Robinson-García**, 2022) the *Research Organization Registry* (*ROR*) at an institutional level (**Lammey**, 2020) and, of course, the typical networks that can also offer information on scientific publications (*Twitter*, *Wikipedia*, *F1000*...).

Alongside this phenomenon of balkanization of information, a further trend is the emergence of third-generation citation indexes, first and foremost among them being *Dimensions* by *Digital Science* (**Herzog**; **Hook**; **Konkiel**, 2020)*.* These new indexes are characterized by a single interface for indexing of resources of different natures. Including not only journals, but all kinds of publications: from repositories, patent databases, to more specialized information such as clinical trials and research projects. Within this group, we also include social media data aggregators such as *Altmetric. com*, *PlumX* and, although more specialized, *Overton* (**Szomszor**; **Adie**, 2022)*.* The current trend is to centralize, combine and integrate data of all kinds. Other examples of metadata aggregators include *OpenAlex* (**Priem**; **Piwowar**; **Orr**, 2022), which describes itself as

> "[a]n open and comprehensive catalog of scholarly papers, authors, institutions, and more"

and Lens (**Jefferson** *et al.*, 2019) which compiles records retrieved from *MAS*, *PubMed*, *CrossRef*, *OpenAlex*, *UnPaywall*, and *ORCID*, among others. Table 1 offers an overview of the content and size of these third-generation bibliometric sources.

Now we have more sources and more ways of accessing them, which has led to a radical change in the formula for retrieving and downloading entries. Together with these traditional interfaces, consultation via APIs has become widespread and is forcing a rethinking of data flows and life cycles (**Torres-Salinas**; **Arroyo-Machado**, 2022a). APIs open up major possibilities for interconnection and interoperability and are already a tangible reality, as is demonstrated by the fact that there are 49 APIs currently available for bibliometric purposes (**Torres-Salinas**; **Arroyo-Machado**, 2022b). The massive opening up of data will allow the creation of *ad hoc* solutions and different interpretations of scientific activity beyond the globalized and Anglo-Saxon mold of mainstream citation indexes, with identifiers (DOIs, PubMedIDs, handles, arXivID, etc.) assuming an essential role.

Table 1. Basic characteristics of third-generation bibliometric databases: *Dimensions*, *OpenAlex*, and *Lens*

Dimensions	***Open Alex***	***Lens.org***
Content and scope		
Publications Authors Organizations Grants	Publications Authors Instructions Concepts	Patents Publications Profiles Biological sequences
Sources indexed		
CrossRef, *PubMed*, thematic and institutional repositories, publishers, *ORCID*, clinical trials registries, *DataCite*, *Figshare*, government guidelines and reports, *ROR ID* and patents offices.	*CrossRef*, *PubMed*, thematic and institutional repositories, *Microsoft Academic Search*, OR-CID, *ROR ID*, *ISSN Network* and *Wikidata*	*CrossRef*, *PubMed*, thematic and institutional repositories, *Microsoft Academic Search*, OR-CID, *OpenAlex*, *UnPaywall*, *CORE full text* and patents from various jurisdictions
Number of entries		
134 million papers 6 million grants 12 million datasets 239 million online mentions 933,000 policy mentions	239 million papers 50,000 papers added daily 213 million authors 109,000 institutions 65,000 concepts	200 million papers 36 million authors 141.9 million patents 429,092,477 biological sequences

Finally, one of the features of many of the products mentioned is their fluid nature. Many will disappear, become obsolete or have a short life span, which also has its implications. Given their mortality and mutability and in some cases poor metadata quality (as in the case of *OpenAlex*), a certain degree of uncertainty must be assumed in terms of their coverage, especially when working with them. This scenario presents new challenges such as the mapping of sources of bibliometric interest; indicating their validity, coverage and possible applications, a task addressed by initiatives

such as the *Registry of Scientometric Data Sources*, and the use of ontology-based systems (**Daraio** *et al.*, 2016). Despite this landscape, it is undeniable that traditional databases such as *WoS* and *Scopus* continue to dominate scientific assessment tasks (**Jappe**, 2020). Factors such as better journal coverage, cover-to-cover indexing, greater accuracy of metadata, more reliable normalization algorithms and thematic classifications make them unbeatable products for the time being.

> " APIs open up major possibilities for interconnection and interoperability and are already a tangible reality, as is demonstrated by the fact that there are 49 APIs currently available for bibliometric purposes "

2.2. Inflation of indicators and metrics

A direct consequence of this explosion of databases is a comparable explosion in the number of indicators. It is difficult to determine how many currently exist. To give an idea of their variety, **Moed** (2017) established ten families of indicators (publications, webometrics, altmetrics, patents, collaboration, etc.) that can be used to characterize research in a multidimensional way (**Bu**; **Waltman**; **Huang**, 2021). A review of the literature almost a decade ago found 108 bibliometric indicators at author level (**Wildgaard**; **Schneider**; **Larsen**, 2014), while a more recent review found up to 32 variations in publication counting methods alone. This abundance is reflected in the metrics of the two main bibliometric suites, *InCites* and *Scival.* The former has a total of 56 indicators (*Clarivate Analytics*, 2018), while the latter has 54 (*Elsevier*, 2019). To these we should also add all the indicators that are being added to journal platforms such as the *Journal Citation Impact - JCI* in the *JCR* (**Torres-Salinas**; **Valderrama-Baca**; **Arroyo-Machado**, 2022), along with the modifications of traditional indicators as in the case of the Crown-Normalized Impact (**Torres-Salinas** *et al.*, 2018) and the never-ending adjustments and improvements to the Hirsch Index (**Alonso** *et al.*, 2009).

In addition, each new database is accompanied by its corresponding metric proposals. Some of the countless examples include *Dialnet Metrics* with its *Journal Dissemination Index* (*IDR*) (**Gregorio-Chaviano** *et al.*, 2021), *Influscience* with its *InfluRatio* (**Torres-Salinas**, 2022a) and *PubMed* with its normalized citation. It seems that no one can resist the urge to create new indicators. This inflation has been further accentuated by altmetrics, as each digital interaction in the scientific context (tweets, likes, replies...) produces a new set of metrics. Many of these are incorporated into aggregators, with recent studies showing that many of them are far from useful. For example, *Altmetric.com* incorporates 19 indicators, however some of them are dispensable because they either have a large regional bias, the original source has disappeared or the values are simply very low (**Robinson-García** *et al.*, 2014). Faced with so many indicators, it is only logical to seek to achieve unification. In this respect, composite indicators now exist such as the *Altmetric Attention Score*, the limitations of which are glaring (**Gumpenberger**; **Glänzel**; **Gorraiz**, 2016).

Table 2. Illustrative example of the calculation of altmetric indicators in two sources: *Altmetric.com* and *CrossRef Event Data*

Doi de la publicación	Altmetric.com		CrossRef Event Data	
	Total tweets	Original tweets	Total tweets	Original tweets
10.1186/1743-422x-2-69	78,610	30,449	235	135
10.1097/mjt.0000000000001402	77,136	27,342	68,838	21,568
10.1016/s0140-6736(21)02243-1	54,628	17,805	910	223
10.1016/s0140-6736(21)00234-8	53,943	8,477	67	61
10.1016/s0140-6736(20)31142-9	36,332	13,876	1,116	509
10.1038/s41550-020-01222-x	793	266	739	251
10.1080/03075079.2020.1712693	1,311	417	1,007	335
10.1056/nejme2029812	44,338	17,850	46,649	18,131

Inflation leads to the existence of metrics of which we have limited knowledge regarding their application and limitations. Accordingly, while aggregators facilitate data collection, they also require super-users with in-depth knowledge of their metrics and data. A clear reflection of the need to better understand the origin and calculation of indicators is the lack of concordance when calculating the same indicator for a scientific article on different platforms (**Zahedi**; **Costas**, 2018). Table 2 gives some examples of the divergences that can occur. For the different dois, we have compiled the number of mentions on Twitter with *Altmetric.com* and *CrossRef Event Data*. As can be seen, the differences can be extreme. These problems are one of the major challenges we face, raising the question as to how we can efficiently manage the proposals made by these so-called social media metrics (**Wouters**; **Zahedi**; **Costas**, 2019) in a contextualized manner without reverting to "bean counting" (**Ràfols** *et al.*, 2016). Having many indicators does not necessarily mean they are better if our methodological approach remains the same (**Barré**, 2019).

2.3. Bibliometrics and its link with data science

Any specialist in our field should not be too surprised by the growing influence of data science in the different branches of knowledge. Ever since its origins, bibliometrics has had a close relationship with computational methods and data

management (**Egghe**; **Rousseau**, 1990). The use of different sources, massive processing of records, calculation and selection of indicators and their visualization are issues that bring us ever closer to data science and, more specifically, to Big Scholarly Data (**Xia** *et al.*, 2017). This latter concept is defined as the application of Big Data and machine learning techniques (acquisition, storage, processing, analytics and visualization) to support the management and analysis of scientific data and information (**Khan** *et al.*, 2017). Bibliometrics falls within this scientific corpus since its content and praxis are perfectly adapted to the 5Vs (Volume, Variety, Velocity, Veracity and Value) that theoretically characterize data science as shown in Figure 2, which is based on the proposal by **Xia** *et al.* (2017).
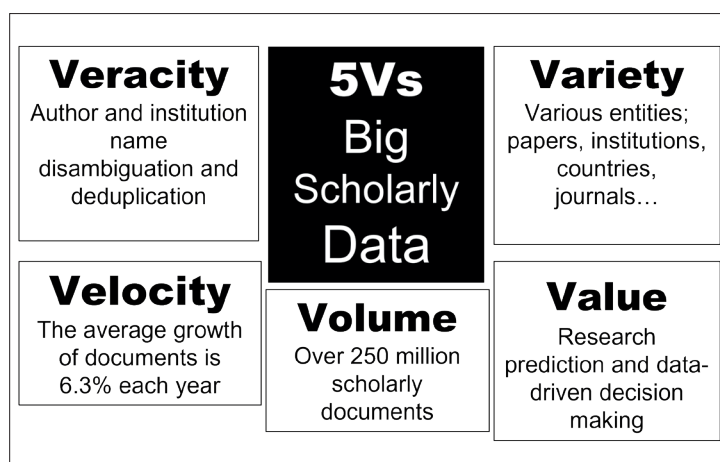
Figure 2. The five Vs defining data science applied to the world of academic and scientific data

The link to data science existed before this new field was reformulated. Data mining techniques, clustering algorithms and information representation have a long and proven tradition in the fields of bibliometrics and information retrieval. A clear example is the work by Henry Small and his proposals for science mapping (**Small**; **Sweeney**; **Greenlee**, 1985; **Small**, 2006), along with the close conceptual link to *Google's PageRank* design (**Leydesdorff**, 2009). One of the aspects that most strongly links us with data science is the ultimate aspiration of synthesizing and making sense of information, which in our case manifests itself in the development of visualization software. This trend ranging from *HistCite* (**Garfield**, 2004) through to *VOSviewer* (**Van-Eck**; **Waltman**, 2017) now appears to be leaning towards languages such as *R* and *Python* based on collective package development. Other noteworthy examples include the *Pybliometrics* package (**Rose**; **Kitchin**, 2019) and, above all, *Bibliometrix* (**Aria**; **Cuccurullo**, 2017). This latter *R*-tool offers the possibility of an interface (*Biblioshiny*) which combines a large number of indicators and graphical representations.

However, apart from the visualizations the size of the studies is also increasing, with samples totaling millions and millions of publications. This is evidenced by papers which include 'large scale' in their title, for example to analyze the coverage of databases (**Visser**; **Van-Eck**; **Waltman**, 2021) or the linguistic analysis of publications (**Saier**; **Färber**; **Tsereteli**, 2022). Indeed, the availability of bibliometric data means that certain topics can be tackled globally, such as scientific mobility between countries and continents (**Robinson-García** *et al.*, 2019), the cognitive structure of social platforms such as *Wikipedia* (**Arroyo-Machado** *et al.*, 2020) and the characteristics of researchers via their *ORCID* codes (**Costas**; **Corona**; **Robinson-García**, 2022). Data science also contributes to the improvement of author disambiguation algorithms (**Tekles**; **Bornmann**, 2020), entity identification (**Wang**; **Zhang**; **Li**, 2022), automatic genre classification (**Bérubé** *et al.*, 2020) and sentiment analysis of citation mechanisms (**Athar**, 2014).

Among the countless other examples of Big Data techniques, a further highlight is the application of machine learning to collaborative networks to determine the future impact of an author (**Grodzinski**; **Grodzinski**; **Davies**, 2021) or to predict the type of contributions made by authors in their work (**Robinson-García** *et al.*, 2020). Deep learning has also been applied to predict citations from metadata (**Ma** *et al.*, 2021) and for the recommendation of scientific articles (**Yang**; **Xu**; **Chen**, 2021). Finally, another symptom of our datification is the fact that more and more bibliometric datasets are being shared openly, whether COVID-19 conversations on *Twitter* (**Banda** *et al.*, 2022) or complete databases based on *Wikipedia* for informetric purposes (**Arroyo-Machado**; **Torres-Salinas**; **Costas**, 2022). To sum up, data science is a multidisciplinary field with contributions that are likely to have direct applications in the field of bibliometrics. While this was already the case, now this process is becoming accentuated. The development and influence of data science has enabled a qualitative leap in both the technical and conceptual development of the discipline and this link is bound to become closer over time.

2.4. The search for meaning and interpretation

A traditional criticism of bibliometrics in other related disciplines (e.g., sociology of science, economics of science), is its eminently empirical basis and its theoretical gaps (**Leydesdorff**, 1998). Bibliometrics has endeavored to deploy a striking array of techniques but at the cost of failing to articulate a sustainable theoretical corpus, with the exception of isolated efforts such as *Citation Theory* (**Cronin**, 1984) and the *Triple Helix* (**Leydesdorff**; **Etzkowitz**, 1998). As seen in the previous section, like computational disciplines it has become a data-driven science (**Bell**; **Hey**; **Szalay**, 2009), i.e., an area driven by data and not proof of preconceived, theory-based hypotheses (**Anderson**, 2008).

> Indicators' inflation leads to the existence of metrics of which we have limited knowledge regarding their application and limitations

This process of extreme datification should be viewed with caution and prompt reflection on essential aspects such as the validity of the sources, the data they contain, the indicators designed using them and, ultimately, the evaluative frameworks. Numerous voices warn of the harmful effects of quantification (**Benedictus**; **Miedema**; **Ferguson**, 2016; **Pardo-Guerra**, 2022), especially when it

> ' The development and influence of data science has enabled a qualitative leap in both the technical and conceptual development of bibliometrics and this link is bound to become closer over time '

is accompanied by the unreflective use of information, as is often the case when using rankings and their indicators in decision-making (**Bastedo**; **Bowman**, 2010). This raises the relatively urgent need for bibliometrics to join the movement towards what has been dubbed "numeroethics" (**Saltelli** *et al.*, 2021) as a means of establishing a critical viewpoint and a more ordered space for reception, assimilation and interpretation of the avalanche of metrics we are immersed in.

This is another of the major challenges we face: bibliometrics is an area that generates large amounts of data, and so we must take steps to ensure its veracity and validity. In this sense, important work is being done in the area known as Responsible Research Metrics (**Wilsdon**, 2018). A good example of its application is the promotion and encouragement of best practices to be applied in our work as consultants in assessment centers and units (**Cabezas-Clavijo**; **Torres-Salinas**, 2021). This is a good start, fostering a global praxis that considers numeroethics together with responsible metrics. Once this is achieved, all that remains is to agree on a framework for the meanings of the different indicators. **Sugimoto** and **Larivière** (2018) point out that for an indicator to be useful, i.e., to be interpreted appropriately, it must be explicitly linked to a concept and the indicator must be a valid representation of that concept. One of the current problems with metric inflation is that it is not always possible to bridge the gap between measure and concept and desire and reality.

We currently seem to have overcome the notion of equating any particular indicator to quality, peer recognition or scientific impact according to Garfield's classic vision. A clear indication of their limitations is that they are not even applicable as an interpretative framework for social metrics, since a scientific journal has little or nothing at all to do with Twitter, and yet no one disputes the idea that both channels should form part of a unified theory of scientific communication. In order to take the first steps, this context requires us to apply more flexible categories and more inclusive concepts such as audiences (**Robinson-García**; **Ráfols**, 2020). Some attempts have been made by expanding on different social theories (**Haustein**; **Bowman**; **Costas**, 2016; **Tahamtan**; **Bornmann**, 2022). Based on the communication paradigm, the key factor would be an assessment of the effectiveness of the issuer's communication of the results in different scientific or social contexts. Indicators, whether bibliometric or altmetric, would be a measure of researchers' success in getting their message to the right audience (**Moed**, 2017) which, as Sugimoto and Larivière point out, is a good way to link indicators to tangible concepts and realities.

Table 3. The three pillars of Evaluative Bibliometrics

Against magical thinking in Informetrics	Combination of indicators and peer review	The indicators depend on the context of the application
Magical thinking substitutes reality with symbols; by modifying these symbols we can modify reality. The magical view leads us to think that citations reflect the quality and contribution of a researcher and that as citations increase so does the quality and contribution. This reasoning is common among researchers and policy makers.	The future of our field involves working together with experts. Bibliometrics is a tool which, when intelligently combined with peer review, aids decision-making processes. Indicators are decision-making tools (monitoring devices) and neither a substitute nor an enemy of peer review.	It is important to understand the context of the indicators in order to select the most appropriate ones. Before carrying out any study and in order to respect scientific uniqueness, the following should be considered as a minimum: (a) the type of assessment unit (b) the dimension to be assessed (c) the objectives of the assessment and (d) the characteristics of the unit (local vs national, areas of specialization).

2.5. Commitment to Evaluative Bibliometrics

Although there is a pressing need to search for an interpretative framework, we should not deceive ourselves; we are still governed by a conservative and descriptive praxis, as revealed by the global and indiscriminate use of the impact factor in the assessment process (**Delgado-López-Cózar**; **Ráfols**; **Abadal**, 2021). This has led to another phenomenon in contemporary bibliometrics: the proliferation of manifestos advocating more transparent, multidimensional and respectful practices, aspects initially identified in the *Metric Tide* report (**Wilsdon** *et al.*, 2015). Among these manifestos, three have prevailed: the *Leiden Manifesto* (**Hicks** *et al.*, 2015), statements such as *DORA* (*https://sfdora.org*) and more recently the *Hong Kong Manifesto* (**Moher** *et al.*, 2020). Their overall effect has been of great value to generate a process of reflection focusing on how to approach assessment processes in a fairer and more inclusive manner. This is reflected in the recent "Agreement on Reforming Research Assessment" (*European Commission*, 2022) reached in the EU framework and implemented through the *Coalition for Advancing Research Assessment* (*https://coara.eu*), which is destined to guide the member states' assessment policies in the coming years.

This agreement states that the core element for decision-making in scientific assessments should be the qualitative judgments of experts. Consequently, this 'new' proposal repeats the idea that peer review is the central mechanism and

that quantitative indicators (at no stage is bibliometrics mentioned) should only be used to support the experts. However, this proposal is not as new as it claims, given that its postulates are highly reminiscent of the basic principles of Evaluative Bibliometrics (EB) as conceived by the Leiden School in the 1980s (**Moed** *et al.*, 1985; **Torres-Salinas**, 2022b). Table 3 recalls the principles of EB (**Moed**, 2017), which should ultimately constitute the working approach to be taken when carrying out our activity and are also compatible with the EU policies. EB takes into account constant qualitative developments

> " There is a relatively urgent need for bibliometrics to join the movement towards what has been dubbed "numeroethics" (**Saltelli** *et al.*, 2021) as a means of establishing a critical viewpoint and a more ordered space for reception, assimilation and interpretation of the avalanche of metrics we are immersed in "

and more modern and relatively original perspectives (**Rafols**; **Stirling**, 2021) advocating a commitment to experts and respect for context. However, in light of Table 3 it is obvious that both the EU and the qualitative wave have taken the principles of EB and disseminated them as an original approach.

This scientific appropriation obliges us to place the postulates of EB at the core of our discipline, a constructive way of countering a trend that views bibliometrics with suspicion and fosters a new breed of bibliometric denialism. This denialism, like others, is based on the denial of empirical evidence regarding the benefits of EB for decision-making. It is also the result of a Manichean interpretation of the manifestos and declarations, extending criticism of the impact factor to the rest of the indicators and practices. An example of this negationist trend would be the extreme application of narrative curricula, forbidding the use of metrics to validate arguments given. The typology of national assessment systems has diversified in the last few years (**Zacharewicz** *et al.*, 2019), going from systems which deny the informative power of bibliometric indicators for decision making (e.g., UK's *REF*) to others which rely on somewhat arbitrary metrics, ignoring experts' warnings and recommendations (e.g., Spain, see **Torres-Salinas** *et al.*, 2018; **Robinson-García**; **Amat**, 2018). It is clear that EB must remain equidistant from both, this culture of metric cancellation and metric worship, and work to create a vision that unites and integrates the different evaluative perspectives.

2.6. Social challenges

Within this integration process, bibliometrics is also beginning to incorporate changes and new social sensitivities. Our publications are increasingly aware of issues relating to inclusion and diversity. Matters such as gender and language have always been part of our agendas, but it is only recently that other more specific variables (race, age, gender identity, etc.) are being systematically incorporated. For example, recent works have quantitatively addressed complex issues such as the influence of race on the choice of research topics (**Kozlowski** *et al.*, 2022) and the global professional status of women scientists (**Boekhout**; **Van-der-Weijden**; **Waltman**, 2021). These are examples of a new vision that highlights situations of inequality.

The bibliometric community has therefore shifted its focus from a perspective that is more concerned with technical and documentary issues (e.g., algorithms, data management and standardization) to one that is more sensitive and attentive to the use made of bibliometric data and its consequences. It should be remembered that indicators, like any social construct, can become tainted with ideological or commercial interests or, even worse, it can perpetuate situations of social-scientific inequality (**Sugimoto**; **Larivière**, 2018). The challenge consists of promoting a more committed bibliometric approach which seeks to reveal the metrics of inequality and moves without hesitation towards a more neutral and less conditioned approach to metrics. It is fundamental to address the diversity of research and different local approaches in a process that incorporates multiple contexts.

In this scenario, scientific assessment services play an essential role, providing the means for correct application of bibliometrics. These services link academics with the real-life scenarios of assessments, which is where our knowledge becomes effective. These services also have other positive functions. According to **Gorraiz** *et al.* (2020), they allow us to forge a positive attitude among stakeholders, preventing misuse of indicators by managers and stimulating informed peer reviews. This expansion through institutional structures appears to be the way forward. Indeed, in Spain these institutional structures have become commonplace since we proposed a systematization of them in 2007 (**Torres-Salinas**; **Jiménez-Contreras**, 2012; **Cabezas-Clavijo**; **Torres-Salinas**, 2021).

3. Concluding remarks

Bibliometric practitioners need to prepare themselves for the issues raised above. At a technical level, we will need classical training relating to databases and indicators. However, above all we will be required to upgrade our technological skills and update our IT and statistical competencies on an almost daily basis.

In addition, we need to take a professional approach to an issue which is yet to be resolved: the transition towards a peaceful coexistence with peer review. This means going beyond our usual boundaries, which are

> " To place the postulates of EB at the core of our discipline can be a constructive way of countering a trend that views bibliometrics with suspicion and fosters a new breed of bibliometric denialism "

closely linked to the content of the degree and work typical of library services, to a scenario of scientific assessment in a more general sense involving collaboration with reviewers, managers and researchers, which requires other types of methodological and administrative skills. Although the pandemic interrupted the efforts to create a professional community to face these challenges (**Torres-Salinas**; **González-Molina**, 2019),

> The challenge consists of promoting a more committed bibliometric approach which seeks to reveal the metrics of inequality and moves without hesitation towards a more neutral and less conditioned approach to metrics

there is still time to create an associative structure and a mechanism that allows us to share experiences, make joint decisions and advocate jointly and unequivocally for our profession.

4. Note

1. Translator's note: The original text in Spanish reads "precisar con todo rigor el instante cronológico en que una idea brota, el proceso de su expansión, el periodo exacto que dura como vigencia colectiva y luego la hora de su declinación".

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Soft news in original videos. Adaptation to *TikTok* of the main Spanish online media

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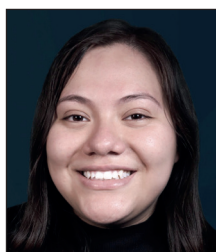
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Abstract

Since the beginning of 2020, media around the world have started and intensified their *TikTok* activity to gain notoriety and reach young people, their main user group. However, as with other previously popularized social media, such as *Facebook* or *Twitter*, the platform's logic is different from that traditionally employed by the media system when developing information products. The objective of this paper is to analyze the degree of adaptation to the logic of this network for the activity developed on it by the Spanish media. For this purpose, a combined methodology of quantitative and content analysis was applied to 446 videos posted by the official user accounts of *20 Minutos*, *Antena 3 Noticias*, *El Diario*, *El Mundo*, and *El País* –the five media outlets with the largest online audience in that period –from the time the accounts were created until January 31, 2022. Specifically, we studied the activity developed, the notoriety achieved, and the interaction obtained, as well as the most common formats, topics, protagonists, and brand identity elements. The results show that the main Spanish media have tried to adapt to the entertainment logic of the platform both with the use of native editing resources as well as through the creation of original materials, predominantly soft news, about entertainment, celebrities, and lifestyle. The videos that gain more notoriety are those that are more adapted to this logic. However, the Spanish media analyzed post less frequently than international media, obtain fewer views, and register lower engagement levels; in addition, they do not use their presence on this social network to promote their other editorial products.

Keywords

Digital journalism; Legacy media; New media; Social media; Hybrid media system; *TikTok*; Short videos; Native videos; Soft news; Hard news; Content analysis; Spain.

1. Introduction

The coexistence of legacy media with the new media that have emerged as a result of the popularization and generalization of internet access in Western countries has consolidated a hybrid media system in the last decade (**Chadwick**, 2013) where supply has multiplied, fragmenting audiences and boosting transmedia consumption (**Jenkins**, 2006). The horizontal communication model generated by the new media –including both digital journalistic media and social networks– has not only enabled the transition to a stage of mass self-communication (**Castells**, 2009) in which digitally literate citizens can become producers of information (**Jenkins**, 2006) but has also forced legacy media to seek new, generally younger, audiences so as to continue playing a relevant role in the public sphere (**Ibarra-Herrera**, 2020). In fact, the involvement of new audiences can contribute to expanding the media message if the media take advantage of the possibilities offered by transmedia consumption (**Scolari**, 2013).

To this end, media and journalists should adapt their practices, routines, and content to the social media logic, which is used by 57% of the global population for information according to data from the latest edition of the *Digital News Report* (**Newman** *et al*., 2022). This has already occurred in new online media (**García-Orosa**; **López-García**; **Vázquez-Herrero**, 2020; **López-García**, 2015; **Salaverría**; **Martínez-Costa**, 2021) and on *Twitter* (**Aruguete**, 2017; **Lasorsa**; **Lewis**; **Holton**, 2012). Since 2020, this has also begun to happen on the short video social network *TikTok*, the most downloaded application in the world in 2022 (**Briskman**, 2022) and the social network that grew the most that year in Spain (*IAB Spain*, 2022). Media and journalists from all over the world are already frequently posting on it (**Negreira-Rey**; **Vázquez-Herrero**; **López-García**, 2022; **Peña-Fernández**; **Larrondo-Ureta**; **Morales-i-Gras**, 2022; **Vázquez-Herrero**; **Negreira-Rey**; **Rodríguez-Vázquez**, 2021; **Vázquez-Herrero**; **Negreira-Rey**; **López-García**, 2022).

Previous research on *TikTok* video content, mostly exploratory, has focused on communication issues related to:

- health (**Ballesteros-Herencia**, 2020);
- politics (**Cervi**; **Marín-Lladó**, 2021; **Gamir-Ríos**; **Sánchez-Castillo**, 2022; **Medina-Serrano**; **Papakyriakopoulos**; **Hegelich**, 2020; **Vijay**; **Gekker**, 2021);
- disinformation and fact-checking (**Basch** *et al.*, 2021; **García-Marín**; **Salvat-Martinrey**, 2022; **Sidorenko-Bautista**; **Alonso-López**; **Giacomelli**, 2021), and
- journalism (**Klug**, 2020; **Negreira-Rey**; **Vázquez-Herrero**; **López-García**, 2022; **Peña-Fernández**; **Larrondo-Ureta**; **Morales-i-Gras**, 2022; **Vázquez-Herrero**; **Negreira-Rey**; **Rodríguez-Vázquez**, 2021; **Vázquez-Herrero**; **Negreira-Rey**; **López-García**, 2022; **Sidorenko-Bautista**; **Herranz-de-la-Casa**; **Cantero-de-Julián**, 2021).

However, no specific media ecosystems have been analyzed –including the Spanish one– despite the fact that 15% of the global population between 18 and 24 years old –those most present on the application– use this platform to get information. In Spain, only 10% do so (**Newman** *et al*., 2022), which shows either a different consumption pattern by the audience or a lower degree of adaptation by the media.

Considering the expansion of *TikTok* around the world, as well as its lower use in Spain for news consumption, the progressive incorporation of media and journalists to this network, and their need to adapt to its logic, the aim of this paper is to analyze the Spanish media's degree of adaptation to this platform. For this purpose, a mixed methodology of quantitative and content analysis was applied to the 446 videos posted by the official accounts of *20 Minutos*, *Antena 3 Noticias*, *El Diario*, *El Mundo*, and *El País* –the five media outlets with the most prominent online audience in that period– since the creation of the account and until January 31, 2022. Specifically, we looked into:

- the activity carried out;
- the notoriety achieved, and the interaction obtained;
- formats;
- topics;
- protagonists; and
- the most common brand identity elements.

The paper is structured as follows. Section 2 reviews the results of previous academic contributions related to the object of study, articulated around the five dimensions of analysis, and formulates the research questions. Section 3 explains the materials used and the methods employed. Section 4 details the results. Finally, section 5 relates them to previous research, and section 6 offers the conclusions and limitations.

2. Literature review

Media from all over the world have been trying to position themselves on *TikTok* since the beginning of 2020 through constant and continuous updates to gain notoriety. According to data compiled by **Vázquez-Herrero**, **Negreira-Rey**, and **López-García** (2022), in February of that year, 234 media and television programs were present on the platform, mainly from Europe, Asia, and North America. Although the most prominent media update their accounts more regularly (**Klug**, 2020; **Sidorenko-Bautista**; **Herranz-de-la-Casa**; **Cantero-de-Julián**, 2021; **Vázquez-Herrero**; **Negreira-Rey**; **López-García**, 2022) than other actors, such as political parties (**Gamir-Ríos**; **Sánchez-Castillo**, 2022), the potential impact of their publications finds a key limitation in the logic of *TikTok* (**Peña-Fernández**; **Larrondo-Ureta**; **Morales-i-Gras**, 2022).

The platform's recommendation algorithm prioritizes engagement (**Bhandari**; **Bimo**, 2022). It does so, according to the patent review of the parallel application *Douyin* prepared by **Zhao** (2021), through a distribution strategy that takes into account both the content, genre, subject matter, and popularity of the videos, as well as

> Since the beginning of 2020, media around the world have started and intensified their *TikTok* activity to gain notoriety and reach young people

the interests of users deduced from their past behaviors and predicting their identities –sex, age, location, occupation. This strategy is also continuously learning: the application divides communities of users with similar characteristics into groups of different sizes and starts distributing videos by the smallest group, allowing only the most successful to move up to the next group in size, and so on. The recommendations are reflected in the "For you" feed (**García-Rivero**; **Martínez-Estrella**; **Bonales-Daimiel**, 2022), which is both the access screen to the application and the only consumption space for most users (**Vijay**; **Gekker**, 2021). This means, in practice, the decentralization of the content displayed (**Zhao**, 2021), which is offered not based on interpersonal connection networks but based on a recommendation algorithm (**Cervi**; **Tejedor**; **Lladó**, 2021). All this encourages the creation of mimetic content (**Zulli**; **Zulli**, 2022) and causes the most popular videos to accumulate the most views and "likes" (**Chen** *et al*., 2019).

As well as other applications for creating and sharing short videos, such as *Byte*, *Snapchat*, and the *Instagram* stories functionality, or the now defunct *Vine*, *Lasso*, and *Musical.ly* (**Anderson**, 2020; **Lu**; **Lu**, 2019; **Shutsko**, 2020; **Wang**, 2020), *TikTok*'s publications are characterized by their extreme shortness, particularly appropriate in today's fragmented consumption context (**Yang**; **Zhao**; **Ma**, 2019), by their highly shareable content, and by the simplicity of native editing (**Kaye**; **Chen**; **Zeng**, 2021; **Wang**; **Gu**; **Wang**, 2019). On the one hand, some of the most relevant native editing resources are the insertion of text, transitions, stickers, emojis, and visual filters, as well as speeding up or slowing down. On the other hand, the application allows various sound resources, such as the addition of music, voice-overs, and sound effects. The main international media on the platform use some of these tools (**Vázquez-Herrero**; **Negreira-Rey**; **López-García**, 2022).

The application allows uploading and editing pre-existing videos, but it also has three native publishing formats: duets, reactions, and original videos captured through the tool itself. Most of the videos published by the international media who were the pioneers in using the app have been created especially for the platform (**Vázquez-Herrero**; **Negreira-Rey**; **López-García**, 2022), while the remaining minority adapt those published on other networks or already broadcast by the media themselves.

The original native videos usually present specific narrative codes generated by the user community itself. Musical challenges and dances were initially the most consumed and replicated formats (**Wang** *et al*., 2022). However, the evolution of the tool has led to the diversification of its content (**Schellewald**, 2021), so these videos now share prominence with many others (**Vizcaíno-Verdú**; **Abidin**, 2022), which is in line with the diversity of users' motivations and interests.

Regarding motivations, a qualitative study based on semi-structured interviews with 28 *Douyin* users in China (**Lu**; **Lu**, 2019) noted that the main expectations for using the tool are relaxation, socialization, entertainment, feeling fashionably, fear of being discriminated against if not present, the illusion of participation in virtual relationships with content generators, and learning about practical issues of daily life. In turn, a survey of 192 users in the same country indicated that the main rewards they expected to obtain were, in order, entertainment, knowledge, positive energy, intelligent recommendation, music, social networks, and commercials (**Lu**; **Lu**; **Liu**, 2020). Similarly, from the perspective of uses and gratifications, **Wang**, **Gu,** and **Wang** (2019) considered that *TikTok* satisfies five major needs: cognitive, pleasure, personal integration, social, and stress relief. In fact, a survey of 306 adolescents aged 11 to 16 in Denmark (**Bucknell-Bossen**; **Kottasz**, 2020) found that the main driver of preponderant passive consumption is entertainment gratification.

In terms of interests, the videos that users find most attractive are those that convey positive emotions, prosocial behaviors, and knowledge (**Lu**; **Lu**, 2019). In line with this, users prefer videos that convey "positive energy" and advocate pro-social behavior, followed by music videos and, in that order, knowledge-sharing, cooking, life advice, tourism, dance, and beauty videos, while news videos only attract 1.9% of users' interest (**Lu**; **Lu**; **Liu**, 2020).

The aforementioned motivations and interests are reflected in the topics of user-generated videos. For example, a content analysis of 1,000 posts published in Germany (**Shutsko**, 2020) showed the following frequencies: comedy and jokes, 32.4%; musical performances, 13.7%; tutorials, 8.9%; dancing, 8.8%; animals, 8%; personal relationships, 7.5%; and beauty, 7.1%. Another study of 447 pieces posted by 12 users between 11 and 17 years old from Spain and the United Kingdom (**Suárez-Álvarez**; **García-Jiménez**, 2021) concluded that the most frequent videos created by them were video selfies, choreographies, music videos, and humorous content.

These types of videos make up an entertainment offering (**Anderson**, 2020) aimed at the younger population (**Ballesteros-Herencia**, 2020), which constitutes the platform's main audience and whose thematic preferences are concentrated on soft news (**Newman** *et al*., 2022, p. 44), which obviously is in contrast to the traditional agenda of the news media. Despite this, although in accordance with their nature and function, most of the media-generated content on *TikTok* has an eminently informative purpose (**Vázquez-Herrero**; **Negreira-Rey**; **López-García**, 2022). However, previous research differs

in its majority distribution between topics usually considered hard news (**Sidorenko-Bautista**; **Alonso-López**; **Giacomelli**, 2021) or soft news (**Peña-Fernández**; **Larrondo-Ureta**; **Morales-i-Gras**, 2022). In fact, the media with the highest engagement are specialized on sports and, to a lesser extent, music, youth entertainment, political news, video games, and cooking recipes (**Peña-Fernández**; **Larrondo-Ureta**; **Morales-i-Gras**, 2022).

> The *TikTok*'s logic is different from that traditionally employed by the media system when developing information products. However, the videos that gain more notoriety are those that are more adapted to this logic

The main motivators for users' active participation on the platform are the desire to expand their social networks, the pursuit of fame, self-expression, and the search for identity (**Bucknell-Bossen**; **Kottasz**, 2020). Similarly, a study (**Omar**; **Dequan**, 2020) of 385 people, mostly from China, linked contributory consumption to self-expression. Thus, as evidenced by the types of videos most produced, *TikTok* is a social media eminently dedicated to protagonist self-representation (**Suárez-Álvarez**; **García-Jiménez**, 2021). This is no different for journalists, who join the platform precisely to reinforce their personal brand and reach new audiences (**Negreira-Rey**; **Vázquez-Herrero**; **López-García**, 2022). Several studies have shown the presence of journalists and media on this platform (**Peña-Fernández**; **Larrondo-Ureta**; **Morales-i-Gras**, 2022). However, the accounts of the latter are not personal, but corporate; moreover, although they sometimes include promotional videos, their aim is linked more to expanding their reach (**Vázquez-Herrero**, 2020), which in personal accounts is closely related to the actions of the protagonists of the videos (**Lu**; **Lu**, 2019; **Lu**; **Lu**; **Liu**, 2020).

The adaptation of their products and the development of new content for social networks are important points in the promotion of the digital brand of the media, which initiate new formats of ephemeral content (stories on *Instagram* or *Snapchat*) or audiovisual microformats (*TikTok*)

> "to disseminate their informative pieces and derive traffic to the web, to promote content, to seek interactivity and user participation, or to create thematic sections" (**Silva-Rodríguez**; **Vázquez-Herrero**; **Negreira-Rey**, 2022, p. 380).

As part of building and promoting their brand image in the virtual space, journalists and media companies want to increase their audience and give greater visibility to their products (**Pérez-Serrano**; **García-Santamaría**, 2021). They use information and self-representation to promote their brand and their products (**Negreira-Rey**; **Vázquez-Herrero**; **López-García**, 2022), although each one makes this adaptation according to their own characteristics and the logic of the selected platform. In this sense, **Vázquez-Herrero**, **Negreira-Rey**, and **López-García** (2022) detected various strategies in the media who are pioneers on *TikTok*: use of the logo (42.9%), presence of journalists (39.1%), presence of the editorial staff (13%), and mention of other own editorial products (8.7%), such as newspapers, websites or accounts on other social networks.

Based on the above review, this paper proposes the following research questions:

RQ1: How often do the Spanish media with the largest online audiences update *TikTok*, and what results do they obtain in terms of views, "likes", comments, and shares?

RQ2: What duration, editing resources, and formats do these media use, and what visualizations and interactions do they obtain as a result?

RQ3: What topics do they focus on, and which ones get the most views and interactions?

RQ4: Who are the protagonists of the videos published, and which protagonists obtain more views and interactions?

RQ5: Do the Spanish media with the largest online audiences use brand identifiers on *TikTok*? If so, which are the most common?

3. Materials and methods

To answer these questions, we analyzed the 446 videos published on the official *TikTok* accounts of *20 Minutos* (@20m), *Antena 3 Noticias* (@a3noticias), *El Diario* (@eldiario.es), *El Mundo* (@elmundo.es) and *El País* (@elpais) from the time the accounts were created until January 31, 2022. These are the five Spanish media that had the largest online audience in 2021 according to the *Digital News Report* for that year (**Newman** *et al.*, 2021), the latest available at the conceptualization stage of this work. The selected accounts represent two types of media, newspapers, and television, far from the information consumption habits of the younger population (**Herrero-Curiel**; **La-Rosa**, 2022; **Newman** *et al.*, 2022); that which uses *TikTok* the most (*IAB Spain*, 2022), and their editorial policies cover a broad ideological spectrum, from social democracy to liberal-conservatism. The links to the videos, the accompanying texts, and the figures associated with their impact were obtained via an automated process on February 3, 2022.

The paper studies five dimensions of the communication developed on *TikTok* by the main Spanish online media:

- activity, notoriety, and interaction (RQ1)
- format (RQ2)
- subject matter (RQ3)
- protagonism (RQ4), and
- brand identification (RQ5).

For this purpose, it combines an exclusively quantitative analysis (RQ1) with the classic quantitative-qualitative methodology of content analysis (**Krippendorff**, 2004; **Neuendorf**, 2016) (RQ2, RQ3, RQ4 and RQ5). The methodological strategy is similar to that applied in previous studies on the use of the platform (**Gamir-Ríos**; **Sánchez-Castillo**, 2022; **Vázquez-Herrero**; **Negreira-Rey**; **López-García**, 2022).

As in previous research (**Gamir-Ríos**; **Sánchez-Castillo**, 2022; **Peña-Fernández**; **Larrondo-Ureta**; **Morales-i-Gras**, 2022; **Vázquez-Herrero**; **Negreira-Rey**; **López-García**, 2022), the quantitative analysis has compared several metric indicators to answer RQ1, referring to activity. On one hand, the update of the media accounts, considering the weekly frequency of publication. On the other, the notoriety of their videos, which observes the number of views achieved. Finally, the interaction generated by the publications, which considers the average number of "likes", shares, and comments obtained by the videos, as well as the corresponding rates relating these variables to the views.

To respond to RQ2, RQ3, RQ4, and RQ5, the content analysis applied a codebook developed from the previous literature review and articulated around the four remaining dimensions, disaggregated into the 13 variables shown in Table 1.

Table 1. Analysis variables and categories

Dimension	Variable		Categories and subcategories
Formal	1. Length		Up to 15 seg / Up to 1 min / Up to 3 min / Photo composition
	2. Direct sound		Present / Absent
	3. Voice-over		Present / Absent
	4. Other added sound		Present / Absent
	5. Text		Present / Absent
	6. Stickers		Present / Absent
	7. Narrative code	Native	Reaction / Duet / Original video
		Non-native	TV news / Interviews / Statements / B-roll / Other
Thematic	8. Topic	Hard news	Foreign affairs / National politics / Economy or business / Education or health / Science or technology / Environment or natural disaster / COVID-19
		Soft news	Entertainment or celebrities / Lifestyle / Arts and culture / Sports / Self-promotion / Non-informative
		Compilation	/
Protagonism	9. Protagonist	With protagonist	Journalist / Political or institutional personality / Celebrity / Specialist / Anonymous people / Animal / Object / Other
		Without protagonist	/
Brand identification	10. Journalist		Present / Absent
	11. Logo		Present / Absent
	12. Allusion to other news		Present / Absent
	13. Allusion to other editorial product		Present / Absent

The formal dimension (RQ2) studies the length (V1) of the videos; the presence in them of different sound resources, such as direct sound (V2), voice-over (V3), and other added sounds (4); the use of graphic elements, such as text overlays (V5) and stickers (V6); and the narrative code used (V7), which distinguishes between native formats, such as reactions, duets and original videos, and non-native formats, mainly composed of pre-existing fragments. Variables 2 to 6, which are dichotomous, partially replicate those employed by **Vázquez-Herrero**, **Negreira-Rey**, and **López-García** (2022) for the study of the editing of videos published on the platform. The categorization of Variable 7 extends that applied by **Gamir-Ríos** and **Sánchez-Castillo** (2022) for the description of narrative codes. The sub-categorization of the non-native narrative codes has been developed by the authors.

The thematic dimension (RQ3) analyzes the predominant theme in each piece (V8), with a first-level categorization that considers the classic distinction between hard news and soft news (**Patterson**, 2000; **Reinemann** *et al.*, 2011), to which a third one, news compilation (**Sidorenko-Bautista**; **Alonso-López**; **Giacomelli**, 2021), has been added for cases in which the inclusion of several pieces of information expands the thematic spectrum to the point of making its concreteness impossible. The primary categories of hard news and soft news have been disaggregated to a second level according to the options contemplated in the *2016 Digital News Report* (**Newman** *et al.*, 2016). Despite the academic controversy regarding its thematic distinction (**Reinemann** *et al.*, 2011), the use of this source and no other derives from the convenience of relating the contents to the informative interests of the young audience (**Newman** *et al.*, 2016).

The protagonism dimension (RQ4), with a single variable of an equally categorical nature (V9), has been prepared by the authors after an initial approach to the corpus.

The dimension referring to brand identification (RQ5) uses dichotomous variables to study the presence of the media's journalists or recognizable personalities (V10), its logo (V11), allusions to specific news published by the media itself

https://www.tiktok.com/@20m

https://www.tiktok.com/@a3noticias
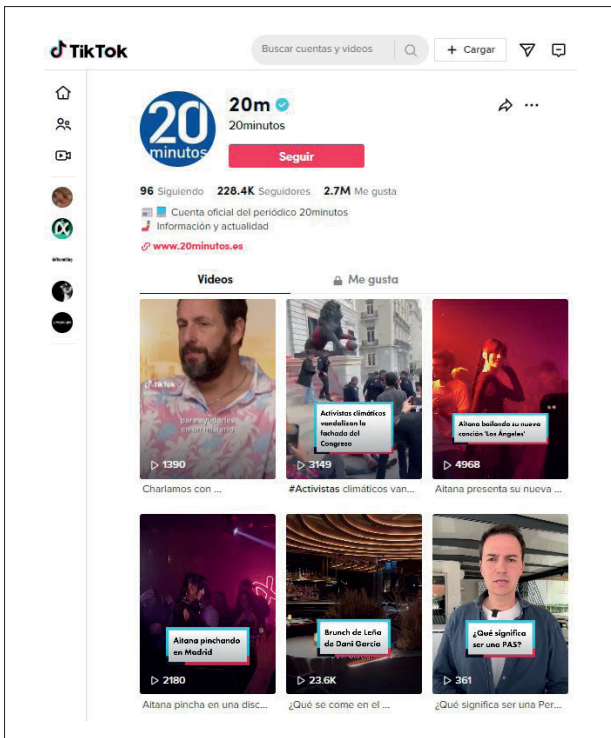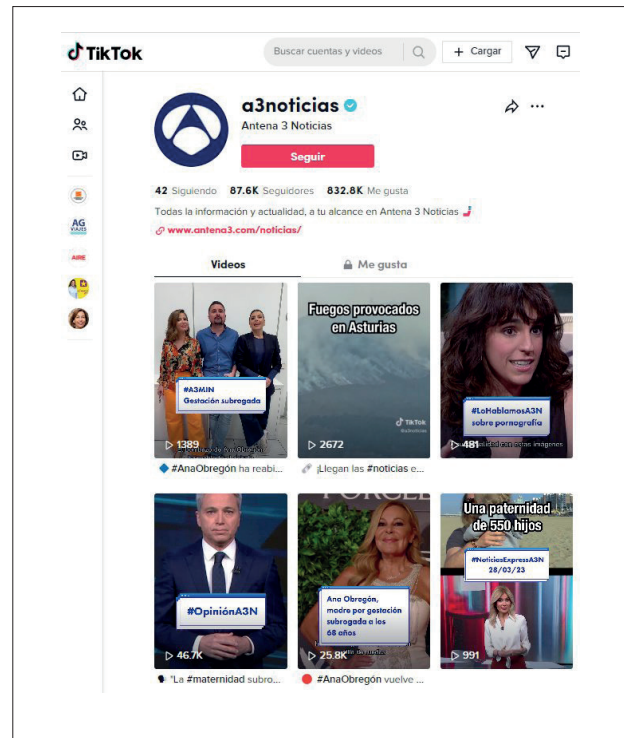
(V12), and allusions to some other editorial product of the media (V13), such as its website, a television program or a printed newspaper. The variables partially replicate those used by **Vázquez-Herrero**, **Negreira-Rey,** and **López-García** (2022).

Coding was carried out by one of the two authors. The test performed by both of them independently and separately on 11.2% of the sample (n=50), offers Krippendorff's Alpha coefficients –calculated using *ReCal* software (**Freelon**, 2013)– always above 0.8. This corroborates the reliability of the results (**Igartua**, 2006).

https://www.tiktok.com/@eldiario.es

https://www.tiktok.com/@elmundo.es
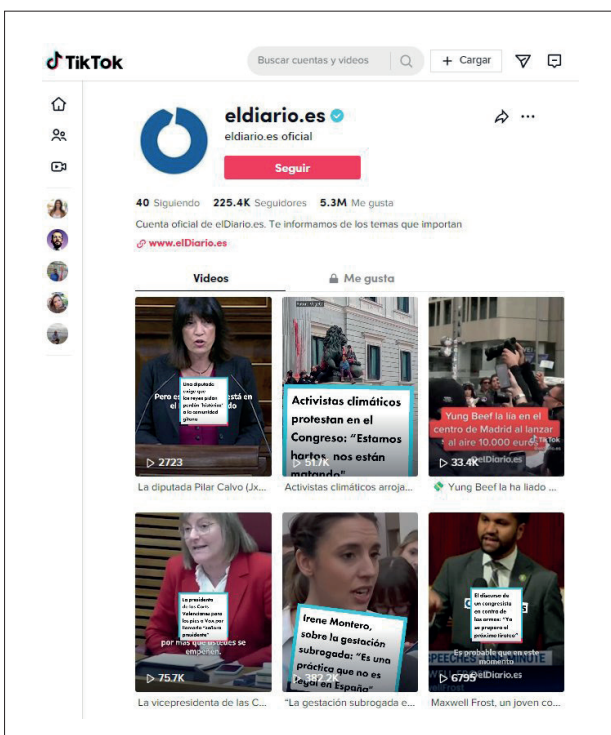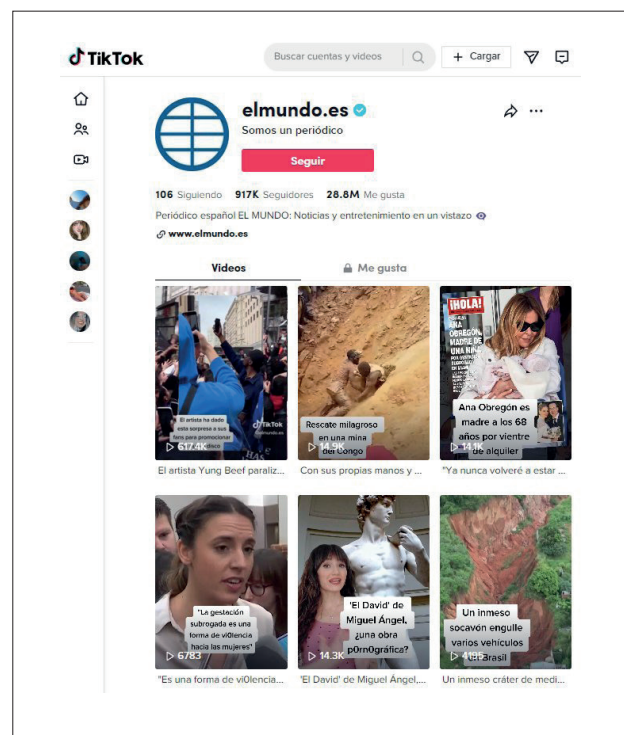
4. Results

4.1 Activity, notoriety, and interaction analysis

The quantitative analysis of the activity carried out by the five media (RQ1) shows very unequal results (Table 2) in terms of the age and frequency of updating the accounts, the notoriety of publications, and the interactions obtained.

Regarding the first aspect, at January 31, 2022, *Antena 3 Noticias* had been on the platform for 110 weeks, followed by *El Mundo* with 37 weeks, *20 Minutos* with 23, *El Diario* with 18, and *El País* with 16. The media with the highest frequency of publication was *El Mundo* (6 videos per week), followed by *El Diario* (3), *El País* (2.8), *20 Minutos* (1.7), and *A3 Noticias* (0.7).

Table 2. Activity, notoriety, and interaction on *TikTok* of the Spanish media with the largest online audience

	20 Minutos	*A3 Noticias*	*El Diario*	*El Mundo*	*El País*
Account	@20m	@a3noticias	@eldiario.es	@elmundo.es	@elpais
Start of the activity	19/8/2021	19/12/2019	23/9/2021	14/5/2021	11/10/2021
Published videos	41	81	56	223	45
Weekly update frequency	1.7	0.7	3.0	6.0	2.8
Views	2,841,717	3,419,407	498,628	15,063,241	2,689,760
Views/video	69,310	42,215	8,904	67,548	59,772
Likes	66,922	193,398	27,998	1,133,043	233,605
Likes/video	1,632	2,388	500	5,081	5,191
Likes/view	2.35%	5.66%	5.62%	7.52%	8.68%
Shares	21,339	8,019	974	56,550	28,717
Shares/video	520	99	17	254	638
Shares/view	0.75%	0.23%	0.20%	0.38%	1.07%
Comments	1,231	3,720	2,264	17,044	5,349
Comments/video	30	46	40	76	119
Comments/view	0.04%	0.11%	0.45%	0.11%	0.20%

Regarding the second aspect, notoriety, the media with the most views was *El Mundo* (15,063,241), in line with its high activity. It was followed by *A3 Noticias* (3,419,407), despite being the account with the lowest update frequency, *20 Minutos* (2,841,717), *El País* (2,689,760), and *El Diario* (498,628). However, the videos published by *20 Minutos* obtained an average number of views higher than those of the other media: 69,310 per video compared to 67,548 for *El Mundo*, 59,772 for *El País*, 42,215 for *A3 Noticias*, and a much lower 8,904 for *El Diario*.

Finally, in terms of interactivity, *El Mundo* led all indexes in absolute terms, with 1,133,043 "likes", 56,550 shares, and 17,044 comments, in line with its higher frequency of updates and higher average number of views. It is followed by *El País* in all cases, with 233,605 "likes", 28,717 shares, and 5,349 comments, despite being the last of the media analyzed to create an account. However, *El País* was the one that registered the best interaction averages, with 5,191 "likes", 638 shares, and 119 comments per publication. It also obtained higher rates of "likes" and shares per view, 8.68% and 1.07%, respectively. *El Diario*, on the other hand, had the highest rate of comments per view (0.45%).

4.2. Format analysis

The study of the format of the videos (RQ2) reflects clear trends in terms of duration and in terms of the presence of sound and graphical editing resources, but not in terms of narrative strategies. Regarding the first aspect, as shown in Table 3, most of the videos published by the analyzed media were between 15 seconds and 1 minute long. Videos in this range almost monopolized the publications of *El Mundo* (94.2%) and *El Diario* (89.3%), and were widely predominant in those of *El País* (75.6%) and *20 Minutos* (65.9%). *A3 Noticias* was the only media in which videos with a length of under 15 seconds predom-

https://www.tiktok.com/@elpais
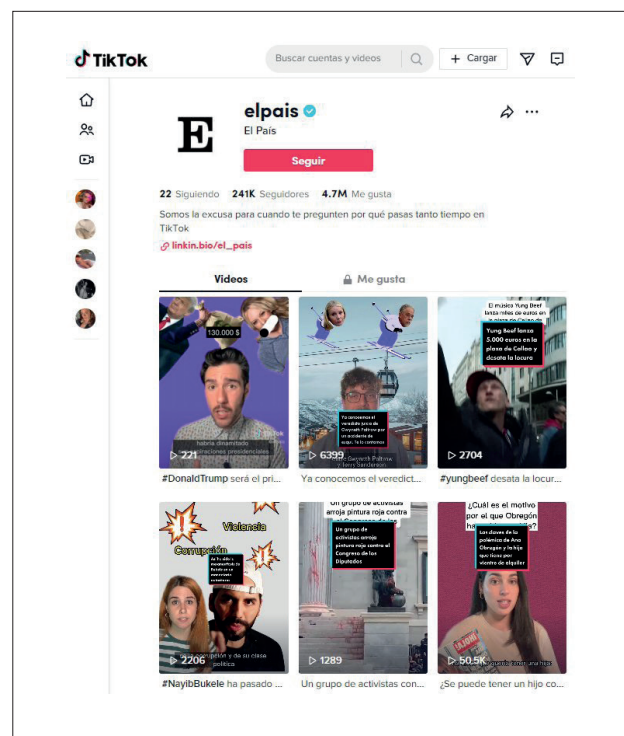
inated (50.6%), although those of up to 1 minute were very close (44.4%). Videos between 1 and 3 minutes in length only recorded significant frequencies in *20 Minutos* (22%) and *El País* (20%), while the presence of photographic compositions was residual or non-existent.

Table 3. Length of the videos posted on *TikTok* by the Spanish media with the largest online audience

	20 Minutos		A3 Noticias		El Diario		El Mundo		El País	
	f	%	f	%	f	%	f	%	f	%
Up to 15 sec	5	12.2	41	50.6	4	7.1	3	1.3	2	4.4
Up to 1 min	27	65.9	36	44.4	50	89.3	210	94.2	34	75.6
Up to 3 min	9	22.0	0	0.0	2	3.6	10	4.5	9	20.0
Photo composition	0	0.0	4	4.9	0	0.0	0	0.0	0	0.0
Total	**41**	**100**	**81**	**100**	**56**	**100**	**223**	**100**	**45**	**100**

However, as shown in Table 4, the videos with the highest average number of views were those between 1 and 3 minutes long (109,591), followed by compositions (102,552), in both cases above the average. Both recorded a similar average number of interactions ("likes", comments, shares): 8,929 and 8,942, respectively.

Table 4. Views and interactions of the videos posted on *TikTok* by the Spanish media with the largest online audience according to their length

	Total	Views		Interactions	
		Total	Average	Total	Average
Up to 15 sec	55	2,268,658	41,248	109,041	1,983
Up to 1 min	357	18,546,147	51,950	1,387,500	3,887
Up to 3 min	30	3,287,740	109,591	267,866	8,929
Photo composition	4	410,208	102,552	35,766	8,942
Total	**446**	**24,512,753**	**54,961**	**1,800,173**	**4,036**

In relation to sound resources and graphical elements, the study offers results that coincide in terms of their presence but divergent in terms of their distribution. As shown in Table 5, the five media studied make intensive use of some of the native editing resources analyzed, which evidences the predominance of videos edited using the application. However, only text overlays are predominant in the videos of the five media, reaching a frequency of 88.9% in the case of *El País*, 87% in *El Mundo*, 80.4% in *El Diario*, 75.6% in *20 Minutos* and 69.1% in *A3 Noticias*. On the other hand, the presence of voice-over is only a predominant feature in two of them –*El Mundo* (65%) and *El País* (60%); the presence of other added sounds in three of them– *El Mundo* (93.7%), *El País* (93.3%) and *20 Minutos* (80.5%); and the presence of stickers in one –*El Mundo* (74.4%). Thus, *El Mundo* is the only media that uses the four native editing resources analyzed, while *El País* uses three (voice-over, other added sounds, and text overlays); *20 Minutos* uses two (other added sounds and text overlays); and *A3 Noticias* and *El Diario* use only one (text overlays). The presence of direct sound, the only non-native sound mode studied, is predominant in *20 Minutos* (68.3%), *A3 Noticias* (66.7%), and *El Diario* (60.7%), the media that least uses native resources.

Table 5. Sound resources and graphical elements of the videos posted on *TikTok* by the Spanish media with the largest online audience

	20 Minutos		A3 Noticias		El Diario		El Mundo		El País	
	f	%	f	%	f	%	f	%	f	%
Direct sound	28	68.3	54	66.7	34	60.7	58	26.0	11	24.4
Voice-over	9	22.0	9	11.1	14	25.0	145	65.0	27	60.0
Other added sound	33	80.5	38	46.9	21	37.5	209	93.7	42	93.3
Text	31	75.6	56	69.1	45	80.4	194	87.0	40	88.9
Stickers	2	4.9	40	49.4	9	16.1	166	74.4	13	28.9

* The coding of the sound resources and graphic elements was carried out in response to a multiple-choice question. The percentages of the presence of their categories were calculated over the total number of videos published by each media.

In addition, as shown in Table 6, videos that use voice-over, other added sounds, and text overlays obtain a higher average number of views and interactions than those that do not, whereas those that do not use direct sound or stickers record more views and interactions than those that do.

Table 6. Views and interactions of the videos posted on *TikTok* by the Spanish media with the largest online audience according to their sound resources and graphical elements

		Total	Views		Interactions	
			Total	Average	Total	Average
Direct sound	Absent	261	15,712,852	60,202	1,159,656	4,443
	Present	185	8,799,901	47,567	640,517	3,462
Voice-over	Absent	242	10,314,086	42,620	713,925	2,950
	Present	204	14,198,667	69,601	1,086,248	5,325
Other added sound	Absent	103	4,896,664	47,540	399,240	3,876
	Present	343	19,616,089	57,190	1,400,933	4,084
Text	Absent	80	2,789,909	34,874	158,895	1,986
	Present	366	21,722,844	59,352	1,641,278	4,484
Stickers	Absent	216	13,595,622	62,943	969,539	4,489
	Present	230	10,917,131	47,466	830,634	3,611

Finally, with regard to narrative codes, detailed in Table 7, videos produced using native formats almost monopolize the publications of *El Mundo* (99.1%), *El País* (97.8%), and *20 Minutos* (90.2%), the media that obtained the highest average number of views per video, almost always exclusively due to the creation of original videos for the platform. On the other hand, both *A3 Noticias* and *El Diario* mostly use videos whose footage is made up of fragments not originally conceived for *TikTok*, with frequencies of 65.4% and 58.9%, respectively. In the first case, through fragments of their TV news programs (37%) and B-roll (25.9%); in the second, through statements (32.1%), interviews (16.1%), and B-roll (10.7%). Only *El Mundo* and *A3 Noticias* make a small use of duets (1.3% and 1.2%, respectively).

Table 7. Narrative codes of the videos posted on *TikTok* by the Spanish media with the largest online audience

	20 Minutos		*A3 Noticias*		*El Diario*		*El Mundo*		*El País*	
	f	%	f	%	f	%	f	%	f	%
Native	**37**	**90.2**	**28**	**34.6**	**23**	**41.1**	**221**	**99.1**	**44**	**97.8**
Reaction	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Duet	0	0.0	1	1.2	0	0.0	3	1.3	0	0.0
Original video	37	90.2	27	33.3	23	41.1	218	97.8	44	97.8
Non-native	**4**	**9.8**	**53**	**65.4**	**33**	**58.9**	**2**	**0.9**	**1**	**2.2**
TV news	0	0.0	30	37.0	0	0.0	0	0.0	0	0.0
Interviews	2	4.9	0	0.0	9	16.1	0	0.0	0	0.0
Statements	0	0.0	0	0.0	18	32.1	0	0.0	0	0.0
B-roll	2	4.9	21	25.9	6	10.7	2	0.9	1	2.2
Other	0	0.0	2	2.5	0	0.0	0	0.0	0	0.0
Total	**41**	**100**	**81**	**100**	**56**	**100**	**223**	**100**	**45**	**100**

As shown in Table 8, videos that use native formats have a higher average number of views than those that do not, with the opposite occurring in terms of interactions. By category, the videos that obtain the most plays and interactions on average are those composed of B-roll (100,486 and 9,187, respectively), followed by original videos (56,503 and 3,979).

Table 8. Views and interactions of the videos posted on *TikTok* by the Spanish media with the largest online audience according to their narrative codes

	Total	Views		Interactions	
		Total	Average	Total	Average
Native	**353**	**19,743,807**	**55,931**	**1,389,735**	**3,937**
Reaction	0	0	0	0	0
Duet	4	24,748	6,187	932	233
Original video	349	19,719,059	56,502	1,388,803	3,979
Non-native	**93**	**4,768,946**	**51,279**	**410,438**	**4,413**
TV news	30	1,076,422	35,881	86,364	2,879
Interviews	11	189,467	17,224	10,135	921
Statements	18	270,083	15,005	18,798	1,044
B-roll	32	3,215,551	100,486	293,987	9,187
Other	2	17.423	8,712	1,154	577
Total	**446**	**24,512,753**	**54,961**	**1,800,173**	**4,036**

4.3. Thematic analysis

The analysis of the predominant topics of the videos (RQ3) shows a clear trend toward the publication of soft news. As shown in Table 8, soft news is predominant in *20 Minutos* (80.5%), *A3 Noticias* (71.6%), *El País* (66.7%), and *El Mundo* (63.7%). Among them, *20 Minutos* and *El Mundo* prioritize lifestyle news (39% and 21.5%, respectively); *A3 Noticias*, entertainment or celebrity news (23.5%); and *El País*, arts and culture (31.1%). The presence of soft news is such a majority in these media that the only topics considered hard news that exceed or approach a frequency of 10% are the environment in *El País* (13.3%), the economy in *20 Minutos* (7.3%), national politics and COVID-19 in *A3 Noticias* (8.6% and 9.9%, respectively), and, once again, the pandemic in *El Mundo* (8.5%). These frequencies are, in any case, lower than those afforded by the same media to the second most important soft news: entertainment/celebrity and art and culture in *20 Minutos* (17.1% in both cases); non-news items in *A3 Noticias* (22.2%); entertainment/celebrity in *El Mundo* (16.1%); and entertainment/celebrity and lifestyle in *El País* (15.6% in both cases). On the other hand, only *El Diario* opted mostly for hard news (69.6%), particularly news on national politics (39.3%) and the environment (12.5%).

Table 9. Topics of the videos posted on *TikTok* by the Spanish media with the largest online audience

	20 Minutos		A3 Noticias		El Diario		El Mundo		El País	
	f	%	f	%	f	%	f	%	f	%
Hard News	**8**	**19.5**	**23**	**28.4**	**39**	**69.6**	**59**	**26.5**	**14**	**31.1**
Foreign affairs	1	2.4	3	3.7	0	0.0	10	4.5	2	4.4
National politics	1	2.4	7	8.6	22	39.3	6	2.7	1	2.2
Economy or business	3	7.3	1	1.2	3	5.4	3	1.3	0	0.0
Education or health	1	2.4	0	0.0	4	7.1	13	5.8	4	8.9
Science or technology	1	2.4	1	1.2	2	3.6	2	0.9	0	0.0
Environment or natural disaster	1	2.4	3	3.7	7	12.5	6	2.7	6	13.3
COVID-19	0	0.0	8	9.9	1	1.8	19	8.5	1	2.2
Soft News	**33**	**80.5**	**58**	**71.6**	**17**	**30.4**	**142**	**63.7**	**30**	**66.7**
Entertainment or celebrities	7	17.1	19	23.5	10	17.9	36	16.1	7	15.6
Lifestyle	16	39.0	4	4.9	0	0.0	48	21.5	7	15.6
Arts and culture	7	17.1	0	0.0	4	7.1	32	14.3	14	31.1
Sports	3	7.3	2	2.5	1	1.8	18	8.1	0	0.0
Self-promotion	0	0.0	15	18.5	2	3.6	8	3.6	1	2.2
Non-informative	0	0.0	18	22.2	0	0.0	0	0.0	1	2.2
Compilation	**0**	**0.0**	**0**	**0.0**	**0**	**0.0**	**22**	**9.9**	**1**	**2.2**
Total	**41**	**100**	**81**	**100**	**56**	**100**	**223**	**100**	**45**	**100**

The most viewed video related to hard news was published by *El País* and was dedicated to the remuneration of internships included in Vocational Training studies (01/20/2022, 1,445,084 views). The most viewed articles published by *El Mundo* (09/21/2021, 1,227,397) and *20 Minutos* (09/20/2021, 182,677) referred to the volcano erupting on the Canary Island of La Palma (09/20/2021, 182,677). That of *A3 Noticias*, to the health personnel dedicated to the containment of the COVID-19 pandemic (03/19/2020, 260,427). That of *El Diario*, to a parliamentary answer of the second vice-president of the Spanish Government and Minister of Labor, Yolanda Díaz, to the then deputy spokesperson of *Vox* in the *Congress of Deputies*, Macarena Olona (12/02/2021, 73,659).

In turn, the video with a soft news theme that obtained the most views was published by *El Mundo* and focused on the personality of the Spanish tennis player Rafa Nadal (01/31/2022, 1,772,697). The most viewed of those published by *20 Minutos* explained three different ways to wear a scarf (12/09/2021, 444,862). The one from *El País* explained the reason why the packaging of *Sugus* pineapple-flavored chewy candies is blue (12/14/2021, 381,994). *A3 Noticias* showed a plague of rats in the Madrid municipality of Alcorcón (01/09/2020, 344,466). *El Diario* recommended three Spanish films starring women (10/08/2021, 77,909).

As shown in Table 10, publications related to hard news recorded higher average views and interactions than those dealing with soft news. By category, the videos with the highest average number of views were those related to foreign affairs (116,751), sports (113,951), education or health (106,368), and environment or natural disasters (100,433). Those with the most interactions were sports (12,293), followed by education or health (10,424), foreign affairs (7,934), and environment (6,114).

> The main Spanish media have tried to adapt to the entertainment logic of *TikTok* both with the use of native editing resources as well as through the creation of original materials, predominantly soft news, about entertainment, celebrities, and lifestyle

Table 10. Views and interactions of the videos posted on *TikTok* by the Spanish media with the largest online audience according to their topics

	Total	Views		Interactions	
		Total	Average	Total	Average
Hard News	**143**	**9,219,116**	**64,469**	**648,590**	**4,536**
Foreign affairs	16	1,868,022	116,751	126,946	7,934
National politics	37	901,674	24,370	39,712	1,073
Economy or business	10	42,500	4,250	2,100	210
Education or health	22	2,340,105	106,368	229,319	10,424
Science or technology	6	104,689	17,448	3,171	529
Environment or natural disaster	23	2,309,953	100,433	140,614	6,114
COVID-19	29	1,652,173	56,971	106,728	3,680
Soft News	**280**	**14,619,182**	**52,211**	**1,093,195**	**3,904**
Entertainment or celebrities	79	3,202,271	40,535	165,743	2,098
Lifestyle	75	3,889,453	51,859	217,001	2,893
Arts and culture	57	3,393,608	59,537	334,285	5,865
Sports	24	2,734,814	113,951	295,043	12,293
Self-promotion	26	515,013	19,808	30,935	1,190
Non-informative	19	884,023	46,528	50,188	2,641
Compilation	**23**	**674,455**	**29,324**	**58,388**	**2,539**
Total	**446**	**24,512,753**	**54,961**	**1,800,173**	**4,036**

4.4. Analysis of the protagonism

The observation of the protagonism of the videos (RQ4) reveals that a large majority of the updates published by the five media analyzed presents a clear protagonist, animated or inanimate. As shown in Table 11, the presence of protagonists is almost total in the videos by *20 Minutos*, with a frequency of 97.6%, and very prominent in *El Diario* (87.5%), *El Mundo* (85.2%), *A3 Noticias* (84%) and *El País* (80%). In addition, four of the media show a clear trend toward videos starring their own journalists or collaborators: 53.7% in the case of *20 Minutos*; 37.7% in *El Mundo*; 37% in *A3 Noticias*; and 35.6% in *El País*. As with the subject matter, only *El Diario* is not part of this general trend, with a greater prominence of political or institutional personalities (42.9%) as opposed to journalists themselves (23.2%), who are in second place. Public celebrities are the second most frequent protagonists in *20 Minutos* (19.5%) and *El Mundo* (17.9%), while in *El País* they are specific objects (22.2%), and in *A3 Noticias*, anonymous people (17.3%).

Table 11. Protagonists of the videos posted on *TikTok* by the Spanish media with the largest online audience

	20 Minutos		*A3 Noticias*		*El Diario*		*El Mundo*		*El País*	
	f	%	f	%	f	%	f	%	f	%
Without protagonist	**1**	**2.4**	**13**	**16.0**	**7**	**12.5**	**33**	**14.8**	**9**	**20.0**
With protagonist	**40**	**97.6**	**68**	**84.0**	**49**	**87.5**	**190**	**85.2**	**36**	**80.0**
Journalist	22	53.7	30	37.0	13	23.2	84	37.7	16	35.6
Political or institutional personality	1	2.4	10	12.3	24	42.9	6	2.7	1	2.2
Celebrity	8	19.5	9	11.1	7	12.5	40	17.9	4	8.9
Specialist	2	4.9	1	1.2	0	0.0	2	0.9	0	0.0
Anonymous people	2	4.9	14	17.3	0	0.0	18	8.1	0	0.0
Animal	0	0.0	3	3.7	1	1.8	8	3.6	2	4.4
Object	4	9.8	1	1.2	3	5.4	19	8.5	10	22.2
Other	1	2.4	0	0.0	1	1.8	13	5.8	3	6.7
Total	**41**	**100**	**81**	**100**	**56**	**100**	**223**	**100**	**45**	**100**

In turn, as shown in Table 12, videos with a clear protagonist obtained higher average views and interactions. Among them, those starring celebrities (83,045 and 6,749, respectively) and journalists from the media itself (56,093 and 3,920) stand out.

Table 12. Views and interactions of the videos posted on *TikTok* by the main Spanish online media according to their protagonist

	Total	Views		Interactions	
		Total	Average	Total	Average
Without protagonist	**63**	**2,257,797**	**35,838**	**227,553**	**3,612**
With protagonist	**383**	**22,254,956**	**58,107**	**1,572,620**	**4,106**
Journalist	165	9,255,356	56,093	646,874	3,920
Political or institutional personality	42	1,107,611	26,372	45,982	1,095
Celebrity	68	5,647,027	83,045	458,962	6,749
Specialist	5	84,697	16,939	915	183
Anonymous people	34	1,993,785	58,641	124,857	3,672
Animal	14	443,656	31,690	39,392	2,814
Object	37	1,194,672	32,288	83,887	2,267
Other	18	2,528,152	140,453	171,751	9,542
Total	**446**	**24,512,753**	**54,961**	**1,800,173**	**4,036**

4.5. Brand identification analysis

The analysis of brand identity (RQ5) indicates that the five accounts analyzed use elements that help to identify and promote the media that publishes the videos. As shown in Table 13, *El Mundo* is the one that uses them most frequently (96.9%), followed by *A3 Noticias* (79%), *20 Minutos* (75.6%), *El País* (71.1%) and *El Diario* (69.6%). The presence of journalists, collaborators, or well-known personalities of the media itself in the piece, as well as the logo, are the two brand identification elements most used by *El Mundo* (81.6% and 86.1%, respectively), *A3 Noticias* (43.2% and 40.7%), and *El Diario* (26.8% and 51.8%). The most used elements by *El País* are a recognizable personal presence (60%) and mentions of its own news (17.8%), an aspect that is also present in *El Diario* (12.5%). *20 Minutos* uses personal presence predominantly (75.6%). *A3 Noticias* also makes intensive use of mentions of its editorial products (42%), which are also present, although less frequently, in *El Diario* (10.7%).

Table 13. Elements of brand identity in the videos posted on *TikTok* by the Spanish media with the largest online audience

	20 Minutos		*A3 Noticias*		*El Diario*		*El Mundo*		*El País*	
	f	%	f	%	f	%	f	%	f	%
Without elements	**10**	**24.4**	**17**	**21.0**	**17**	**30.4**	**7**	**3.1**	**13**	**28.9**
With elements*	**31**	**75.6**	**64**	**79.0**	**39**	**69.6**	**216**	**96.9**	**32**	**71.1**
Journalist	31	75.6	35	43.2	15	26.8	182	81.6	27	60.0
Logo	3	7.3	33	40.7	29	51.8	192	86.1	4	8.9
Allusion to other news	1	2.4	3	3.7	7	12.5	4	1.8	8	17.8
Allusion to other editorial product	0	0.0	34	42.0	6	10.7	10	4.5	0	0.0
Total	**41**	**100**	**81**	**100**	**56**	**100**	**223**	**100**	**45**	**100**

* The coding of the elements of brand identity was carried out in response to a multiple-choice question. The percentages of the presence of their categories were calculated over the total number of videos published by each media.

5. Discussion

This work has investigated the adaptation to *TikTok* of the Spanish media with the largest online audience: *20 Minutos*, *A3 Noticias*, *El Diario*, *El Mundo*, and *El País*. On one hand, we studied the activity developed, the notoriety achieved, and the interaction obtained from the date their accounts were created until January 31, 2022 (RQ1). On the other hand, we analyzed the formats (RQ2), topics (RQ3), protagonists (RQ4), and brand identity elements present (RQ5) in the videos published during this period.

In terms of activity (RQ1), the frequency of publication varies greatly, ranging from 0.7 videos per week for *A3 Noticias* to 6 for *El Mundo*, with no clear update pattern based on duration, presence on the platform or the digital native nature of the media. These frequencies are below those detected in the main international media. Of the 19 international media that were verified in February 2020, included in the work of **Vázquez-Herrero**, **Negreira-Rey** and **López-García** (2022), 12 published around two videos per week; the other seven, more than four. Another paper on the activity of 13 major international media during the first four months of 2020 (**Sidorenko-Bautista**; **Herranz-de-la-Casa**; **Cantero-de-Julián**, 2021) found even higher weekly posting frequencies: seven accounts posted up to two videos a week; one posted five; two posted around 10; and three posted 20 or more. Another analysis conducted over a similar period on 46 non-native

digital media and 31 native digital media in the United States (**Klug**, 2020) shows that the accounts of the online versions of traditional media have a very low publication volume if the regional ones are taken into consideration as well as the nationals; the results of our study closely mirror them.

Regarding notoriety, with the exception of *El Diario*, which always obtains lower figures, the average number

> '
> The Spanish media analyzed publish less frequently than international media, obtain fewer views, and register lower engagement levels; in addition, they do not use their presence on *TikTok* to promote their other editorial products
> '

of views is between 40K and 70K. On the other hand, interaction is led by *El Mundo*, the media with the highest frequency of updates and the highest average number of views. The average number of views per video is between 1.6K and 5.2K; also excluding *El Diario*. Both figures are higher than those detected in international media in the initial phase of their presence on the platform (**Vázquez-Herrero**; **Negreira-Rey**; **López-García**, 2022), but far below the averages observed in news accounts in a later period (**Peña-Fernández**; **Larrondo-Ureta**; **Morales-i-Gras**, 2022), as are shares and comments. In their study, **Vázquez-Herrero**, **Negreira-Rey** and **López-García** (2022) observed an average of 23.1K views, 1.4K "likes" and 13.5 shares; the rate of "likes" received per view was 8%. Based on a longer period, another study on 23,174 videos from 143 accounts belonging to media and journalists from 25 countries (**Peña-Fernández**; **Larrondo-Ureta**; **Morales-i-Gras**, 2022) found higher average views and interactions for corporate accounts: 250,483 views, 22,855 "likes", 575 shares and 301 comments. Another analysis on 28,234 Spanish-labeled videos related to the COVID-19 pandemic published between March and May 2020 (**Ballesteros-Herencia**, 2020) –not exclusively journalistic– detected an average of 26,352 "likes", 351 shares and 254 comments.

Regarding the format (RQ2), the predominant length of the videos of all media is between 15 seg and 1 min, with the exception of *A3 Noticias*, which started its activity on the platform during a period of footage limited to 15 seg. This is congruent with the average duration of 22 seg detected in international media (**Vázquez-Herrero**; **Negreira-Rey**; **López-García**, 2022) and is in line with both the current fragmented consumption scenario (**Yang**; **Zhao**; **Ma**, 2019) and the preferences of young audiences on *TikTok* (**Cheng-Stahl**; **Literat**, 2022).

In relation to native editing resources, the five media studied make intensive use of some of the sound and overlay possibilities analyzed, with text overlays being the most frequently used option. Both aspects are in line with what **Vázquez-Herrero**, **Negreira-Rey** and **López-García** (2022) observed in the international context, in which the most used native editing resources were text (49%), transitions (24.5%), some type of stickers (17.9%), visual filters (11.4%), emojis (10.3%) and speeding up or slowing down (7.1%), with a minority of 33.2% of the videos not presenting any of them. Our study also shows that the media that make the most use of these resources (*El Mundo*, *El País* and *20 Minutos*) are the ones that obtain the highest average number of views.

Finally, native formats predominate with respect to narrative strategies, especially videos originally conceived for the platform, which is also congruent with the global trend detected by the same study (**Vázquez-Herrero**; **Negreira-Rey**; **López-García**, 2022), according to which 85.3% of the videos published by the international media pioneers in using the platform have been created especially for the platform. This shows that, as in the rest of the world, the Spanish media have understood the need to adapt to the logic of this social network. In fact, the only two media in which the adaptation of pre-existing material is superior to the publication of original content, *A3 Noticias* and *El Diario*, are also the ones that obtain the lowest number of views per video.

In relation to the topic of the publications (RQ3), soft news predominates globally, again with the only exception of *El Diario*, which opts for hard news on national politics. In particular, the presence of entertainment and celebrity videos is remarkable, as well as those dedicated to lifestyle and, to a lesser extent, those dedicated to art and culture. This is in line with the results of some previous research. On one hand, the work of **Vázquez-Herrero**, **Negreira-Rey** and **López-García** (2022) found that 58.2% of the content generated on *TikTok* by the media have an eminently informative purpose, compared to 24.5% with humorous intention, 16.8% for promotional purposes and 0.5% dedicated to challenges; among those with informative purpose, news stood out, mostly dedicated to current issues, with the COVID-19 pandemic and celebrities being the most frequent topics. On the other hand, the research by **Peña-Fernández**, **Larrondo-Ureta** and **Morales-i-Gras** (2022) detailed the predominance of curious and light-hearted content as a complement to the main activity of the media and journalists, with a minority of accounts offering current affairs information adapted to the characteristics of the platform's language. However, the work of **Sidorenko-Bautista**, **Alonso-López** and **Giacomelli** (2021) on the videos published by thirteen verifying media in relation to the COVID-19 pandemic showed the predominance of economic, climate, and technological content, among others (29%), followed by topics of social interest (23%), political (18%) and health (17%).

In terms of protagonism (RQ4), journalists are the most recurrent, again with the exception of *El Diario*, in whose videos there is a greater presence of political and institutional personalities; in addition, there is a prominent presence of celebrities, with interviews with sportspeople, musicians and influencers.

The findings regarding themes and protagonism are congruent with the information preferences of the Spanish population (**Martínez-Costa**; **Sánchez-Blanco**; **Serrano-Puche**, 2019) and, in general, of young people (**Newman** *et al*., 2016). This shows an effort by the main Spanish media to adapt to the algorithmic functioning of the social network (**Bhandari**; **Bimo**, 2022; **Zhao**, 2021) and to satisfy, to the extent that their informative function allows it, the motivations and interests of the user community (**Bucknell-Bossen**; **Kottasz**, 2020; **Lu**; **Lu**, 2019; **Lu**; **Lu**; **Liu**, 2020), although because of their nature it is not possible for them to replicate the most frequent content on the platform (**Shutsko**, 2020; **Suárez-Álvarez**; **García-Jiménez**, 2021). The presence of journalists is also in line with the start of content generation by professionals (**Negreira-Rey**; **Vázquez-Herrero**; **López-García**, 2022; **Peña-Fernández**; **Larrondo-Ureta**; **Morales-i-Gras**, 2022). Thus, the analyzed media are in line with the trend of international media to use a light tone, although they are among the minority that offers current information adapted to the characteristics of the platform's language (**Peña-Fernández**; **Larrondo-Ureta**; **Morales-i-Gras**, 2022).

Finally, despite the main brand identifier (RQ5) being generally the journalist themselves, the presence of the media logo is also notable, a way of protecting the copyright of the images and audios they generate or provide (**Shutsko**, 2020), in an inverse relationship to that detected globally (**Vázquez-Herrero**; **Negreira-Rey**; **López-García**, 2022). However, the scarce references to other news of the media or other editorial products of their own, such as printed newspapers, podcasts, websites, television programs or social networks, denotes the lack of connection of their presence on *TikTok* with their main activity. Thus, the analyzed media use *TikTok* to disseminate their brand among the young population, but not to establish cross-relationships with their products that would serve to promote them and increase their audience.

6. Conclusions

Spanish media have tried to adapt to the entertainment logic of the platform both in the use of native editing resources and in the creation of original materials and the development of soft news content. In fact, the media that gain the most notoriety on average are those that have adapted more to this logic, i.e., those that opt for soft news through original videos that use native resources. However, they publish less frequently than international media, their videos get fewer views, and their accounts register lower levels of engagement, probably as a result –except in the case of *A3 Noticias*– of their limited age on the platform; in addition, they do not take advantage of their presence on the network to promote their products.

This paper has some limitations, derived from its exploratory nature and the limited presence of Spanish media on *TikTok* at the time of its conceptualization. The first aspect implies the existence of scarce previous literature, which has prevented the establishment of hypotheses. The second aspect has made it impossible to form a corpus that would be representative of the Spanish media ecosystem as a whole; we consider, however, that the sample selected, composed of the five media with the largest online audience in the period analyzed, is sufficiently relevant to be representative of its apex. Future research may focus on the production of content for this platform from the newsrooms, i.e., on the adaptation to *TikTok* of the practices and routines of professional journalists, as was done at the time with respect to *Twitter*. They may also evaluate the journalistic quality of such content, as well as the interaction of the audience with it through the comments and whether they serve to articulate debates inherent to a deliberative conception of public opinion.

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Which of the metadata with relevance for bibliometrics are the same and which are different when switching from *Microsoft Academic Graph* to *OpenAlex*?

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Abstract

With the announcement of the retirement of *Microsoft Academic Graph* (*MAG*), the non-profit organization *OurResearch* announced that they would provide a similar resource under the name *OpenAlex*. Thus, we compare the metadata with relevance to bibliometric analyses of the latest *MAG* snapshot with an early *OpenAlex* snapshot. Practically all works from *MAG* were transferred to *OpenAlex* preserving their bibliographic data publication year, volume, first and last page, DOI as well as the number of references that are important ingredients of citation analysis. More than 90% of the *MAG* documents have equivalent document types in *OpenAlex*. Of the remaining ones, especially reclassifications to the *OpenAlex* document types journal-article and book-chapter seem to be correct and amount to more than 7%, so that the document type specifications have improved significantly from *MAG* to *OpenAlex*. As another item of bibliometric relevant metadata, we looked at the paper-based subject classification in *MAG* and in *OpenAlex*. We found significantly more documents with a subject classification assignment in *OpenAlex* than in *MAG*. On the first and second level, the classification structure is nearly identical. We present data on the subject reclassifications on both levels in tabular and graphical form. The assessment of the consequences of the abundant subject reclassifications on field-normalized bibliometric evaluations is not in the scope of the present paper. Apart from this open question, *OpenAlex* seems to be overall at least as suited for bibliometric analyses as *MAG* for publication years before 2021 or maybe even better because of the broader coverage of document type assignments.

Keywords

Subject classification; Fields of study; Concepts; Bibliographic data; Metadata; Document types; Citation analysis; *Microsoft Academic Graph*; *MAG*; *OpenAlex*; Bibliometrics.

1. Introduction

Since its launch in 2015, *Microsoft Academic Graph* (*MAG*; **Sinha** *et al.*, 2015) had been a promising new data source for bibliometric analyses due to its large coverage and set of available metadata (**Harzing**; **Alakangas**, 2017). Therefore, *MAG* has been the object of many studies, in particular comparisons with other important bibliographic databases. In one of the last and thus far largest ones, **Visser**, **Van-Eck**, and **Waltman** (2021) compared *MAG* with *Web of Science*, *Scopus*, *Dimensions*, and *Crossref*.

In May 2021, it was announced by the *Microsoft Blog* (2021) that the *Microsoft Academic* website, application program-ming interfaces (API), and snapshots would retire on December 31, 2021. Soon after that, the non-profit organization *OurResearch*, aiming at providing "a fully open catalog of the global research system" (*OurResearch*, 2021), announced they would preserve and incorporate the last full *MAG* corpus, only excluding patent data, and to continue and hope-fully improve it. Another main source of data should be *Crossref*. In January 2022, *OpenAlex* (http://openalex.org) was launched and provided API access to their services as well as data dumps for any purposes. The *Curtin University's Open Knowledge Initiative* (*COKI*) has already started to monitor the development of *OpenAlex*, in particular assessing and comparing the value added by *OpenAlex* to *MAG* and to *Crossref*, both in coverage of publications and other research output (**Kramer**, 2022).

Scheidsteger *et al.* (2018) studied the possibility of using *MAG* data for the calculation of field- and time-normalized ci-tation scores. They compared the scores derived from subject classifications and coverage in *MAG* to those derived from subject categories and coverage in *Web of Science* (*WoS*). In the present study, we are interested in comparing metadata that are relevant for bibliometric analyses (in particular field and time normalization of citations) of *MAG* and *OpenAlex*:

- the coverage of documents over the years,
- the agreement of bibliographic data,
- the numbers of references of each document,
- the kind and distribution of document types,
- the distribution of and relation between subject classifications.

2. Data and methods

Microsoft Academic Graph (*MAG*)

We downloaded the *Microsoft Academic Graph* (*MAG*) dataset via the *Microsoft Azure* portal at the end of December 2021 and received data timestamped with 6 December 2021 (**Sinha** *et al.*, 2015). See:

https://www.microsoft.com/en-us/ research/project/academic

We were not able to get newer data at the beginning of 2022 after the official expiration date of the *MAG* service. According to the *OpenAlex migration guide* (*OpenAlex*, 2021), no patents have been transferred from *MAG* to *OpenAlex*. Therefore, we excluded all items with docu-ment type *Patent* from the compari-son. In order to facilitate the distinc-tion between the two databases, we keep the case of the document type names as they are used in both databases. In particular, *MAG* types are capitalized. Because *MAG* data do not contain the full year 2021, we restricted our analyses to the publication years before 2021. Thus, we considered 197,445,041 papers in *MAG* of which 95,160,734 pos-sess a DOI.

https://www.microsoft.com/en-us/research/project/microsoft-academic-graph

OpenAlex

The *OpenAlex* data dump was retrieved on 9 February 2022 with an update timestamp of 31 January 2022 on the main table (*works*). Both datasets were imported into and processed in our locally maintained *PostgreSQL* database at the *Max Planck Institute for Solid State Research* (Stuttgart, Germany). Before the publication year 2021, we have a total of 198,606,165 works in *OpenAlex*, of which 96,268,256 possess a DOI.

Documents in *MAG* and *OpenAlex* can be linked via a unique ID. *OpenAlex* like *MAG* only contains linked references. For most works, there are "Fields of Study" available –called "concepts" in *OpenAlex* and (only there) all linked to a respective *Wikidata* ID via the table *concepts*. For more details on the approach and the structure of *OpenAlex* see **Priem**, **Piwowar**, and **Orr** (2022).

Software

The statistical evaluations have been done by using *R* (*R Core Team*, 2020), the graphical presentation in Figure 1 by using the *R* package *ggplot2* (**Wickham**, 2016), and the alluvial plots Figure 2, Figure 3, Figure 4, and Figure 5 by using the *R package alluvial* (**Bojanowski**; **Edwards**, 2016).

https://docs.openalex.org
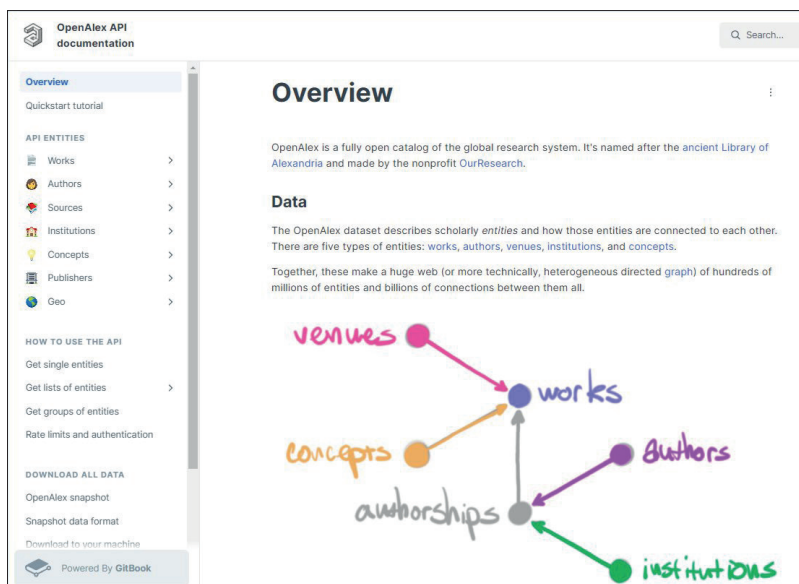
3. Results

Coverage of publication years

Only 777 IDs from *MAG* are not incorporated in *OpenAlex*, starting with one item in 1952 and reaching a maximum of 201 in 2020. The document types in *MAG* of these missing items are about 40% *Journal* and *None*, each, and about 15% *BookChapter*. Over the whole period since 1952, of the 777 *MAG* IDs, 654 have DOIs, only two of them could not be found in *Crossref*. 347 of these DOIs contain the ISBN Bookland prefix "978" or "979" and therefore point to books or book chapters, but only one third of them is assigned to the types *Book* or *BookChapter* in *MAG*. As expected, the number 777 of missing *MAG* IDs exactly matches the difference between the overall number of *MAG* papers and 197,444,264 *OpenAlex* works that have a *MAG* ID associated with them. Of the 654 DOIs, 23 had been associated with more than one *MAG* ID (two of them with three, the other ones with two) and –apart from one (*10.1016/j.physrep.2013.03.005*)– all could be found in *OpenAlex* and each had one occurrence less. In 16 cases the resp. preprint entry had been dropped in favor of the resp. journal article entry, and in two cases the resp. entry as journal article had been dropped in favor of the resp. entry as book chapter.

There are 1,161,901 works indexed in *OpenAlex* that have *no* corresponding record in *MAG*, 1,108,176 of them having a DOI in *OpenAlex*, in particular 1,877 documents before 1800, the first publication year in *MAG*. In the following, only the documents both databases have in common are going to be investigated.
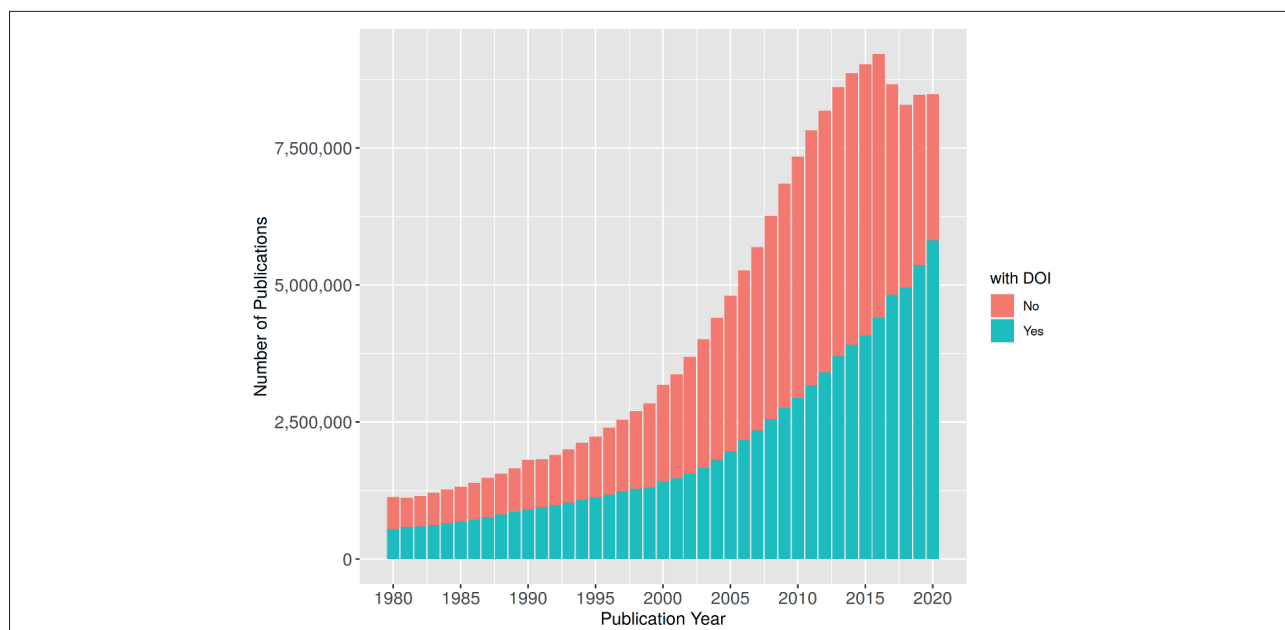

Figure 1. Numbers of common *OpenAlex-MAG* documents across the years 1980 to 2020

Figure 1 shows the annual numbers of common documents with and without DOI across the years 1980 until 2020. The unexpected decrease of the total number starting in 2017 is due to the shrinking number of documents without a DOI which in turn is by far dominated by the number of documents with *no* document type assigned.

> 'Unexpectedly, the total number of documents starts to decrease in 2017. This is due to a shrinking number of documents without a DOI which in turn is by far dominated by the number of documents with *no* document type assigned'

Comparison of bibliographic data

For the 197,444,264 documents in *OpenAlex* with an ID in *MAG*, we firstly check if the bibliographic data from *MAG*, like volume, issue, first page, last page, and DOI are preserved after the transfer to *OpenAlex*. When volume or issue were available in *MAG* these data have been completely transferred to *OpenAlex*. This is also the case for first and last pages and DOIs. During our investigation, we found some issues with the data quality:

(i) In more than 28,800 cases, the fields "first page" and "last page" contained not a single number but the same range of numbers, e.g., "35-46".

(ii) More than 810,028 DOIs occur *more than once* in the dataset, 7,626 of them at least ten times, and 235 at least 100 times. Of the top 100 most-frequently occurring DOIs, only 29 can be resolved.

(iii) More than 6,000 DOIs contain non-latin characters, less than 200 could be resolved.

Secondly, concerning the number of (linked) references for a document, we counted the entries in *OpenAlex*'s table of references for each work (*works_referenced_works)* and found *no* deviation from the respective values (*nref*) in the corresponding table of *MAG*. But *nref* had been calculated including patent references. Obviously, in *OpenAlex*, the references to patents had been kept but not the patent documents themselves.

Document types

In *MAG*, we are dealing with seven document types: *Book, BookChapter, Conference, Dataset, Journal, Repository*, and *Thesis*. Table 1 lists the numbers and shares of their occurrences. Nearly 45% of the documents are classified as *Journal*, but nearly the same number of documents have *no* document type assigned (*None*).

In *OpenAlex*, there are 26 document types that inherit their definition from another major data source *Crossref* –as documented in *Crossref*'s *content type markup guide* (*Crossref*, 2021). Obviously, all works in *OpenAlex* with a *Crossref* DOI receive their document type from there. Those document types with a share of more than 0.1% of all documents are listed in Table 2. There are additional nine million items in *OpenAlex* assigned to the document type *journal-article* as compared to the *MAG* document type *Journal*. The *OpenAlex* items of document type *journal-article* cover nearly one half of all documents, but the items without a document type (*none*) are still more than a third of all. However, the document types *Journal* and *None* occur about equally frequently in *MAG*. The increased numbers of journal articles, conference proceedings, and book chapters are especially interesting from a bibliometric point of view.

As displayed in Table 3, about 90.1% of all items have the obviously equivalent document types in both databases.

Table 1. Number and percentages of document types in *MAG*

Document types in *MAG*	Number of items	Percentage of items
Journal	87,430,385	44.28
None	85,844,335	43.48
Thesis	5,925,439	3.00
Conference	5,053,232	2.56
Repository	4,779,269	2.42
Book	4,588,285	2.32
BookChapter	3,691,552	1.87
Dataset	132,544	0.07
Sum	197,445,041	100.00

Table 2. Numbers and percentages of document types in *OpenAlex*

Document types in *OpenAlex*	Number of items	Percentage of items
journal-article	96,547,138	48.61
none	70,155,602	35.32
book-chapter	9,588,895	4.83
proceedings-article	7,051,207	3.55
dissertation	6,126,640	3.08
book	4,522,989	2.28
posted-content	3,093,874	1.56
report	464,164	0.23
dataset	276,311	0.14
monograph	212,401	0.11
other types	566,944	0.29
sum	198,606,165	100.00

Table 3. Shares of transfers of equivalent document types between *MAG* and *OpenAlex*

MAG	*OpenAlex*	Number of items	Percentage of items
Journal	*journal-article*	86,395,430	43.76
None	*none*	70,154,418	35.53
Thesis	*dissertation*	5,917,802	3.00
Book	*book*	4,421,867	2.24
Conference	*proceedings-article*	4,285,360	2.17
BookChapter	*book-chapter*	3,662,705	1.86
Repository	*posted-content*	3,018,186	1.53
Dataset	*dataset*	132,421	0.07
Sum		177,988,189	90.15

The more interesting cases are the reclassifications. Therefore, we show in Figure 2 an alluvial diagram of the corresponding document types in both databases, *excluding* the transfers from Table 3.

Those reclassifications occurring in relevant numbers that sum up to nearly 9.3% of all documents, are listed in Table 4. In order to get an impression of the quality of these reclassifications, we add some characteristics of respective random samples of ten documents, each. All of them had a DOI –as we could expect because of *Crossref* being the main source of document type information. Indeed, less than 10,000 documents *without* a DOI have been reclassified, i.e., about 0.05% of all 20 million reclassifications.

‘ The reclassification to type *book-chapter* in *OpenAlex* seems to work fairly well. This is also the case for *journal-article*. In particular, many documents using non-latin character sets are now getting classified, and a substantial number of items with DOIs and the document type *Repository* in *Microsoft Academic Graph* are correctly recognized as *journal-article* ’
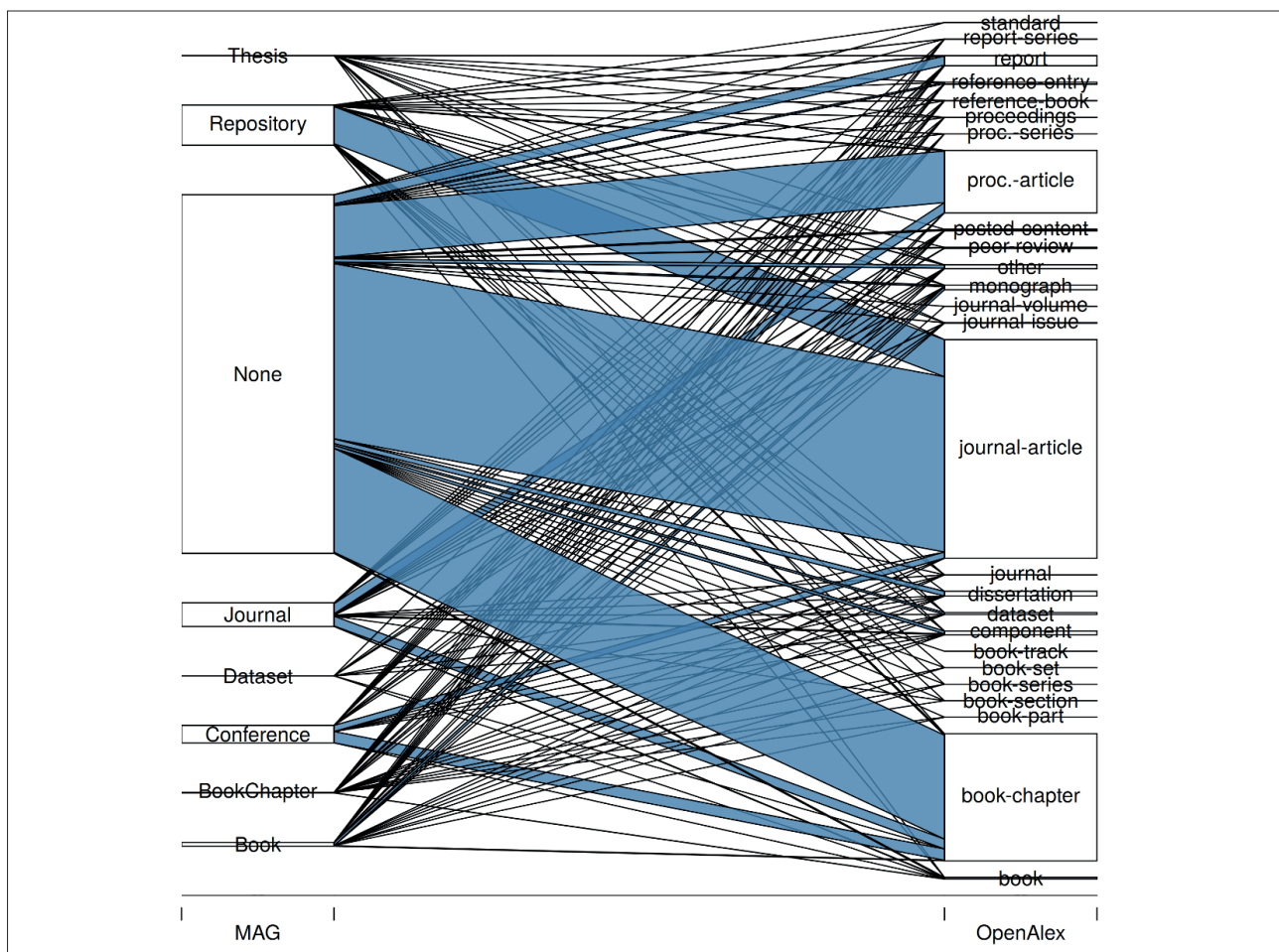
Figure 2. Alluvial diagram of document type reclassifications from *MAG* to *OpenAlex*

Table 4. Shares of reclassifications of document types from *MAG* to *OpenAlex* together with some characteristics of corresponding random samples of ten documents. Shares of at least 0.1% are shown.

Document types			Random samples of ten documents	
MAG	*OpenAlex*	Percentage of all documents	Span of publication years	Other characteristics
None	journal-article	3.88%	1928 - 2018	Eight titles with Cyrillic, far-eastern, or Arab character set; one Dutch document with English title;
None	book-chapter	2.30%	1984 - 2020	All DOIs containing the Bookland prefix "978"; one German title
None	proceedings-article	1.14%	1971 - 2019	Seven Cyrillic or Arab titles; only two conference papers identifiable
Repository	journal-article	0.82%	1988 - 2016	Four *ChemInform Abstracts*; five *arXiv* papers: All DOIs point to published papers; one *SSRN* preprint from 2012, published in 2016 in a journal
Conference	book-chapter	0.25%	2001 - 2020	All published in conference proceedings by *Springer* as part of a book series; eight DOIs contain Bookland prefix "978"; seven documents from LNCS; only one document noted by *Springer* as chapter, the others as conference papers
Journal	proceedings-article	0.23%	2010 - 2017	Three poster presentation abstracts in the supplement of a journal; four documents from the *Proceedings of SPIE*; two documents in proceedings of a medical conference as supplement to a journal.
Journal	book-chapter	0.22%	1965 - 2017	All book chapters; eight DOIs contain Bookland prefix "978"
Conference	journal-article	0.14%	1987 - 2014	No conference papers; four publishers incorrect in *MAG*
None	report	0.20%	1964 - 2019	Seven technical reports or geological survey data from US and Canadian governments
None	dissertation	0.10%	1973 - 2018	Theses and dissertations at institutional repositories (five US, four Brasilian, one Greek)

The reclassification to type *book-chapter* in *OpenAlex* seems to work fairly well. This is also the case for *journal-article*. In particular, many documents using non-latin character sets are now getting classified, and a substantial number of items with DOIs that *MAG* had labelled as *arXiv* preprints with document type *Repository* are correctly recognized as *journal-article*. On the other hand, the assignment of *ChemInform* abstracts to this document type is debatable, but they are definitely no preprints. Conference papers seem to be a special case: Documents incorrectly assigned to *Journal* get corrected to *proceedings-article*, but for documents without a document type in *MAG* the assignment of *proceedings-article* is not that accurate or at least difficult to verify. In case of *MAG* type *Conference*, the reclassification to *journal-article* seems to be overall correct, whereas the reclassification of *Lecture notes in computer science* (*LNCS*) contributions to *book-chapter* seems to be the result of their appearance as part of book series and of the format of their DOIs containing the Bookland prefix "978" (*DOI.org*, 2019). This fact should be kept in mind for bibliometric studies in computer sciences, which probably should include book chapters as well.

Subject classifications

OpenAlex states in their migration guide (*OpenAlex*, 2021) that they use the same taxonomy as *MAG* but have reduced the number of "Fields of Study" (FoS) by removing those with less than 500 papers associated. Moreover, they have applied a different algorithm, i.e., model *V1*, that used paper titles and a few other features, but not abstract data. The latter were only used later in 2022 with the implementation of model *V2* of their open-source software (**Priem**; **Piwowar**, 2022).

A quick look reveals the persistence of all 19 top-level FoSs (level=0) from *MAG* as well as of 284 of the 292 FoSs of the next level (level=1). Table 5 lists the distribution of all FoS levels from 0 to 5 in both databases. The strongest reduction of FoS numbers occurs in the levels 3 to 5 where less than 10% persist. However, in both databases, *MAG* and *OpenAlex*, the granularity does not necessarily increase with the FoS level. Level 3 has the highest number of FoSs. The total number of FoSs on all levels is 714,971 in *MAG* and only 65,073 in *OpenAlex*, which means a reduction to 9.1%. Interestingly, in levels 2 to 5, a substantial number of FoSs have less than 500 works assigned to them, e.g., more than 4,000 FoSs on levels 2 and 3, respectively.

Table 5. Distribution of FoSs in *MAG* and *OpenAlex*

Level	*#MAG*	*#OpenAlex*	Difference (#MAG - #OpenAlex)	Percentage (#OpenAlex/#MAG*100)
0	19	19	0	100.00
1	292	284	8	97.26
2	137,415	21,460	115,955	15.62
3	330,275	24,768	305,507	7.50
4	134,843	12,406	122,437	9.20
5	112,127	6,136	105,991	5.47
All levels	714,971	65,073	649,898	9.10

Top-level Fields of Study

Even if the top-level FoSs persist, they are very differently associated to the papers. For example, one paper (accessed on 26 April 2022) had one top-level FoS and one level-1 FoS in *MAG*, but it has six additional top-level FoSs and one additional level-1 FoS in *OpenAlex*:

https://api.openalex.org/works/W2178938397

Table 6 shows some statistical measures of the common publication set concerning the number of papers with a FoS assigned. The total number of papers with any FoS is significantly increased: 30.5 of 48.9 million documents without any FoS in *MAG* have at least one FoS in *OpenAlex* –28.8 million having a top-level FoS in *OpenAlex*– so that the coverage increases from 74.6% to 86.6%. The number of assignments per paper to a top-level FoS is drastically increased in *OpenAlex*: About 147 million papers in *MAG* and about 171 million papers in *OpenAlex* have at least one top-level FoS assigned to them. Of those papers, 65 thousand in *MAG* and 53 million in *OpenAlex* have multiple top-level FoSs (up to seven) assigned to them. Thus, by applying the concept algorithm of *OpenAlex*, the multiple assignment to top-level FoSs proliferated.

Table 6. Numbers and percentages of documents with FoS assigned

Statistical measures of common publication set	MAG	OpenAlex
Number of documents	197,444,264	197,444,264
Number of assignments to any FoS	1,092,748,572	1,095,801,888
Number of documents with any FoS	148,518,539	175,993,558
Number of documents without any FoS	48,925,725	21,450,706
Coverage of documents with any FoS	75.22%	89.14%
Mean assignments to any FoS per document	7.36	6.23
Number of assignments to a top-level FoS	147,426,219	229,560,450
Number of documents with a top-level FoS	147,360,860	170,900,225
Coverage of documents with a top-level FoS	74.63%	86.56%
Number of documents with multiple top-level FoS assignments	65,359	52,966,153
Percentage of documents with multiple top-level FoS assignments of all documents with FoS assignments	0.04%	30.99%
Mean assignments to a top-level FoS per document	1.000444	1.343243

Table 7 compares the number of assignments to top-level FoSs in both databases. The highest relative increase is to be seen with Arts and the strongest decrease with Engineering.

Table 7. Comparison of the numbers of top-level FoS assignments in *MAG* and *OpenAlex*

FoS	# MAG	% MAG	# OpenAlex	% OpenAlex	% OpenAlex / % MAG
Art	3,717,975	2.52	12,873,508	5.61	2.22
Biology	13,169,649	8.93	14,242,938	6.20	0.69
Business	5,174,422	3.51	12,010,241	5.23	1.49
Chemistry	14,191,693	9.63	20,029,716	8.73	0.91
Computer science	12,312,525	8.35	25,678,965	11.19	1.34
Economics	3,130,346	2.12	4,064,798	1.77	0.83
Engineering	8,472,749	5.75	3,117,013	1.36	0.24
Environmental science	3,533,640	2.40	6,702,031	2.92	1.22
Geography	4,447,923	3.02	7,053,608	3.07	1.02
Geology	3,061,102	2.08	3,621,249	1.58	0.76
History	3,059,007	2.07	4,454,112	1.94	0.94
Materials science	11,063,791	7.50	17,437,416	7.60	1.01
Mathematics	6,021,856	4.08	6,101,501	2.66	0.65
Medicine	27,897,600	18.92	36,085,634	15.72	0.83
Philosophy	2,010,846	1.36	5,916,152	2.58	1.89
Physics	6,873,294	4.66	9,938,209	4.33	0.93
Political science	6,775,718	4.60	17,760,011	7.74	1.68
Psychology	8,063,945	5.47	13,966,595	6.08	1.11
Sociology	4,448,138	3.02	8,506,753	3.71	1.23
All assignments	147,426,219		229,560,450		

Of the nearly 49 million documents without any FoS in *MAG*, nearly 29 million received at least one top-level FoS in *OpenAlex*. Table 8 shows the distribution of document types in *MAG* across both sets. About 80% of the papers without any FoS have no document type and half of them receive a top-level FoS in *OpenAlex* amounting to two thirds of all these documents. Considering the bibliometrically most interesting document types *Journal*, *BookChapter*, *Book*, and *Conference*, about 90% have a top-level FoS in *OpenAlex* amounting to a quarter of all those documents.

Table 8. Distribution of document types in MAG across the documents without any FoS in *MAG*, and share of documents with some top-level FoS in *OpenAlex*

Document type in *MAG*	#*MAG* no FoS	#*MAG* no FoS, but top-level FoS in *OpenAlex*	Percentage of papers with a top-level FoS in *OpenAlex* but no FoS in *MAG*
None	38,273,234	19,266,767	50.34
Journal	5,102,461	4,566,743	89.50
Thesis	2,453,810	2,249,289	91.67
BookChapter	1,416,913	1,235,266	87.18
Book	1,356,096	1,241,835	91.57
Repository	251,384	228,099	90.74
Conference	58,961	54,332	92.15
Dataset	12,866	9,561	74.31
Sum resp. average	48,925,725	28,851,892	58.97

About 77.2% of all top-level assignments in *MAG* persist in *OpenAlex*, but this proportion varies significantly across the 19 top-level FoSs as Table 9 clearly shows –from less than a quarter for Engineering to more than 90% for Material Sciences and Medicine.

Table 9. Distribution of top-level FoSs in *MAG* and number and percentage of top-level FoSs persistent in *OpenAlex*.

FoS	#*MAG*	#*OpenAlex*	% persistent
Art	3,717,975	2,620,365	70.48
Biology	13,169,649	10,411,044	79.05
Business	5,174,422	4,200,803	81.18
Chemistry	14,191,693	12,194,451	85.93
Computer science	12,312,525	10,878,013	88.35
Economics	3,130,346	2,131,877	68.10
Engineering	8,472,749	2,023,815	23.89
Environmental science	3,533,640	2,712,884	76.77
Geography	4,447,923	2,366,289	53.20
Geology	3,061,102	2,302,537	75.22
History	3,059,007	1,650,999	53.97
Materials science	11,063,791	10,010,937	90.48
Mathematics	6,021,856	4,028,415	66.90
Medicine	27,897,600	25,953,084	93.03
Philosophy	2,010,846	1,240,834	61.71
Physics	6,873,294	5,517,376	80.27
Political science	6,775,718	4,899,049	72.30
Psychology	8,063,945	6,198,019	76.86
Sociology	4,448,138	2,520,233	56.66
All assignments	147,426,219	113,861,024	77.23

Figure 3 shows an alluvial plot of the transfer of paper-based subject classifications *without* the persistent FoS assignments of Table 9 so that the remaining reclassifications become more visible. Given the fact that *all* 342 possible reclassifications do indeed occur in our publication set, only the 94 connections with at least 200,000 occurrences are shown. Several reclassifications occur in comparable measures in both directions, e.g., in the pairs Sociology & Psychology, Sociology & Political Science, or Psychology & Medicine. Other ones show a significant transfer in mainly one direction, like from Engineering to Computer Science, from Mathematics to Computer Science, from Biology to Chemistry, or from Chemistry to Materials Science.

As an example, the distribution of assignments of the documents with top-level FoS Engineering in *MAG* to top-level FoSs in *OpenAlex* is given in Table 10. The right two columns indicate the share of the assignments to the respective FoS alone.
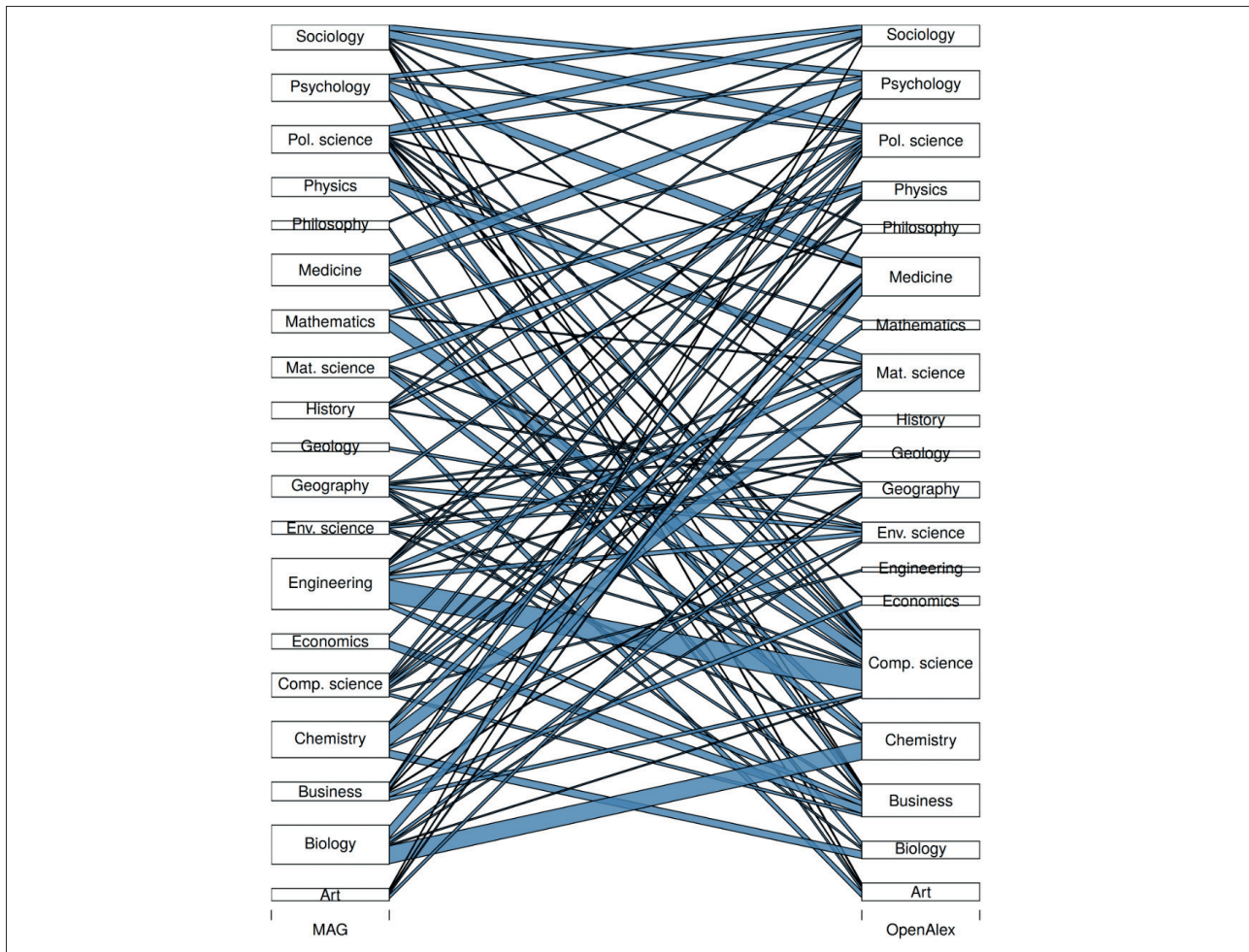
Figure 3. Alluvial diagram for the top-level FoS reclassifications from *MAG* to *OpenAlex*, showing only reclassifications that occur at least 200,000 times

Table 10. Distribution of assignments of the 8,472,749 documents with top-level FoS Engineering in *MAG* and their top-level FoSs in *OpenAlex*

FoS in *OpenAlex*	Number	Percentage	Number of papers that are assigned only to this FoS	Percentage of papers that are assigned only to this FoS
Art	155,994	1.84	83,922	53.80
Biology	37,572	0.44	21,505	57.24
Business	890,319	10.51	371,279	41.70
Chemistry	117,583	1.39	47,157	40.11
Computer science	3,880,097	45.80	2,199,873	56.70
Economics	52,304	0.62	10,490	20.06
Engineering	2,023,815	23.89	649,984	32.12
Environmental science	715,720	8.45	277,495	38.77
Geography	121,729	1.44	46,386	38.11
Geology	222,817	2.63	98,828	44.35
History	66,291	0.78	16,244	24.50
Materials science	1,028,047	12.13	524,787	51.05
Mathematics	122,422	1.44	20,450	16.70
Medicine	175,371	2.07	86,643	49.41
Philosophy	22,304	0.26	7,247	32.49
Physics	310,876	3.67	90,731	29.19
Political science	412,799	4.87	155,831	37.75
Psychology	245,947	2.90	99,949	40.64
Sociology	166,826	1.97	44,179	26.48
Sum/Average	10,768,833	127.10	4,852,980	45.07

Only nearly one quarter of the 8,472,749 documents that are assigned to Engineering in *MAG* is assigned to the same FoS in *OpenAlex* but nearly one half of them is assigned to the FoS Computer Science. There is a significant amount of multiple assignments in *OpenAlex* so that the total number of FoS assignments is increased by more than a quarter to 10,768,833.

Table 11 shows the top 10 most occurring lists of FoS assignments of Engineering papers from *MAG*. Individual FoSs are separated by a semicolon. Interestingly, the combination Computer science; Engineering comes second and, together with Engineering at the third place, it amounts to more than 75% of the assignments to Engineering in *OpenAlex*.

Table 11. Top 10 most occurring lists of top-level FoS assignments in *OpenAlex* for the 8,472,749 documents assigned to Engineering in *MAG*

Most frequent top-level FoS assignments in *OpenAlex*	Number of papers with most frequent top-level FoS assignments in *OpenAlex*	Percentage of papers with most frequent top-level FoS assignments in *OpenAlex*
Computer science	2,199,873	25.16
Computer science; Engineering	827,861	9.47
Engineering	649,984	7.43
Materials science	524,787	6.00
Business	371,279	4.25
Environmental science	277,495	3.17
Political science	155,831	1.78
Business; Computer science	151,568	1.73
Computer science; Materials science	149,538	1.71
Engineering; Environmental science	101,786	1.16

In order to get an impression of the validity of the (automatic) subject reclassifications from *MAG* to *OpenAlex*, we looked at the extreme cases concerning the proliferation of top-level FoSs as given in Table 7. We took random samples of those documents in the common dataset that have a FoS Art resp. Engineering in *MAG*. Additional restrictions were the publication year 2020, the document type *Journal* and the availability of a DOI. Finally, we only chose documents that received a unique top-level FoS in *OpenAlex*. We retrieved the documents and tried to assess the suitability of their FoS assignments in both databases, denoted by a numeric score of 1 (correct), -1 (not correct), and 0 (possibly plausible). Tables 12 and 13 show the respective results, including content information that lead to our assessment and a summed up suitability score for each database. Of course, the applied method can only produce preliminary results with a low accuracy but they could give a hint for further investigations.

Table 12. Assessment of the suitability of unique top-level FoS assignments for a random sample from the 3,717,975 documents assigned to Art in *MAG*

FoS in *OpenAlex*	DOI of sample document	Content information	*MAG* FoS suitability score	*OpenAlex* FoS suitability score
Art	*10.25162/afmw-2020-0005*	Musicology	1	1
Biology	*10.25223/brad.n38.2020.a10*	Botany	-1	1
Business	*10.47287/cen-09844-newscripts*	Chemical & Engineering News: Consumer Products; 2020 holiday gift guide	-1	1
Chemistry	*10.4312/keria.22.1.143-202*	Latin poetry	1	-1
Computer science	*10.1016/s1634-7358(20)44295-0*	Endocrinology (Medicine)	-1	-1
Economics	*10.33008/ijcmr.202019*	Creative performative installation to a film	1	-1
Engineering	*10.1061/(asce)gm.1943-5622.0001816*	Editorial in *Journal of Geomechanics*	-1	1
Environmental science	*10.1002/awwa.1472*	Obituary in *Journal American Water Works Association*	0	1
Geography	*10.4000/geomorphologie.14981*	Archaeology in Special issue on "geomorphologie et environnements karstiques"	0	1
Geology	*10.1180/mgm.2020.16*	Obituary in *Mineralogical Magazine*	1	1
History	*10.18223/hiscult.v9i1.3154*	History and Culture	0	1
Materials science	*10.33383/2020-006*	"Recommendations for restoration of historical transparent coatings in Pushkin Museum"	-1	1
Mathematics	*10.51481/amc.v56i1.823*	Obituary in *Acta Medica Costarricense* (Biomedicine)	1	-1
Medicine	*10.1136/bmj.m3665*	Obituary in *BMJ*	1	1

FoS in *OpenAlex*	DOI of sample document	Content information	*MAG* FoS suitability score	*OpenAlex* FoS suitability score
Philosophy	*10.13125/medea-4529*	Italian Poetry (Cultural Studies)	1	1
Physics	*10.1038/d41586-020-02136-4*	Photo of the sun (News in *Nature*)	-1	1
Political science	*10.1080/10402659.2020.1823575*	*Peace review: A journal of social justice*	1	1
Psychology	*10.1037/amp0000602*	Obituary of a Psychologist	1	1
Sociology	*10.35293/srsa.v37i1.229*	Book review on recent history of South Africa with socio-economic dimension	-1	0
Sum of suitability scores			2	10

Table 13. Assessment of the suitability of unique top-level FoS assignments for a random sample from the 8,472,749 documents assigned to Engineering in *MAG*

FoS in *OpenAlex*	DOI of sample document	Content information	*MAG* FoS suitability score	*OpenAlex* FoS suitability score
Art	*10.22452/sare.vol57no2.10*	Poetry and Fiction	-1	1
Biology	*10.1182/blood.2020008691*	Cells in blood	-1	1
Business	*10.4028/www.scientific.net/amm.896.371*	Tax rules for buildings in *Applied Mechanics and Materials*	1	1
Chemistry	*10.1021/cen-09813-scicon10*	*C&EN* (section Materials) on engineered micro- and nanostructures that mimic spiders	1	1
Computer science	*10.17577/ijertv8is120305*	Comparative study of building rating systems	1	-1
Engineering	*10.1007/s35658-020-0295-y*	Automatized shuttle buses	1	1
Environmental science	*10.3130/aije.85.19*	Study on hygrothermal behavior of wall assembly ... impact of rain penetration and water absorption	1	1
Geography	*10.5632/jila.83.539*	Development of 'businesses-utilizing urban parks'	-1	1
History	*10.1146/annurev-anchem-091119-120456*	Evolution of analytical sciences in the United States: A historical account	-1	1
Materials science	*10.1063/1.5145201*	Development of microLED in *Appl.phys.lett.*	1	1
Mathematics	*10.1007/s11071-020-05950-7*	Obituary in *Nonlinear dynamics*	1	1
Medicine	*10.1055/a-1309-0141*	Dental technology	1	1
Philosophy	*10.1007/s40544-020-0360-9*	Obituary in *Mechanical engineering*	1	-1
Physics	*10.1007/s35658-019-0154-x*	Risk assessment with respect to thermal propagation	1	1
Political science	*10.1038/s41587-020-0702-1*	Correction in *Nature biotechnology*	1	-1
Psychology	*10.12775/jehs.2020.10.05.035*	Future bachelors of motor transport	1	-1
Sociology	*10.4079/gbl.v20.1*	Article published by *Global business languages*	-1	-1
Sum of suitability scores			7	7

Maybe, obituaries and editorials in the sample in Table 12 tend to be classified as Art in *MAG*, but in *OpenAlex*, the scientific subject seems to be more important. Telling by the suitability score, for this sample, the *OpenAlex* subject classifications are definitely more suited. In case of Engineering (see Table 13), there are far more cases which could plausibly be assigned to two or more FoSs, which is also expressed by the same and relatively high suitability scores for both databases.

Level-1 Fields of Study

The FoSs of level-1 are even more interesting for bibliometric evaluations and comparisons because their number is similar to the number of the journal based subject categories in *WoS* and *Scopus* thereby enabling a similar granularity for field normalizations. For our dataset, a total of 74,454 types of reclassifications occur, i.e., on average about 255 for each of the 292 FoSs in *MAG*. Because of their number, it is no longer feasible to present the reclassifications in tabular form. In Figure 4, the most frequent reclassifications of level-1 FoSs from *MAG* to *OpenAlex*, are shown. On this level, a fair amount of symmetry can be detected. For example, in case of Internal medicine, the biggest transfers to other FoSs seem to occur in both directions. This impression remains even if going to a much smaller threshold value as, e.g., 50,000 reclassifications.
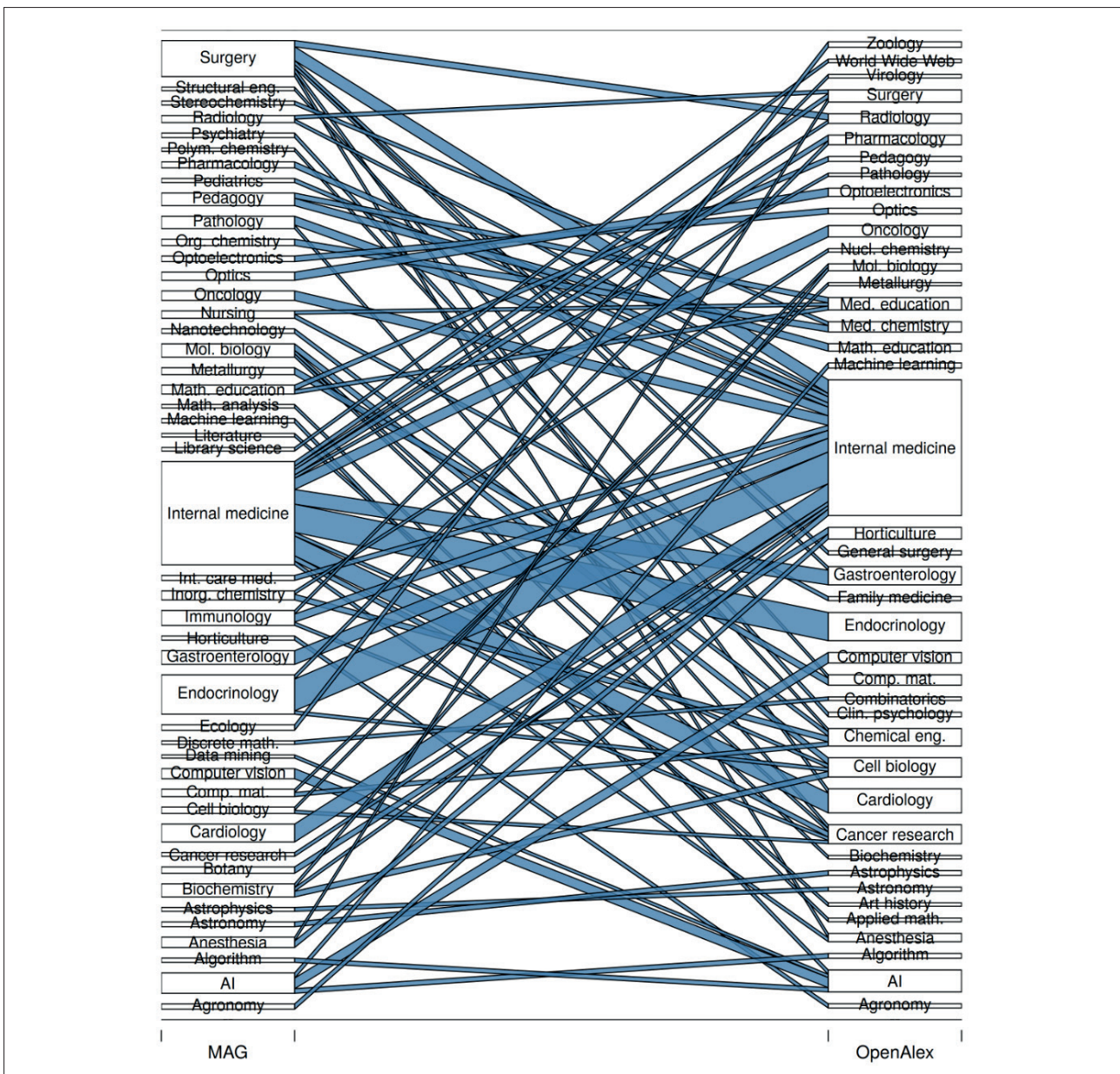
Figure 4. Alluvial diagram for the level-1 FoS reclassifications from *MAG* to *OpenAlex*, showing only reclassifications that occur at least 250,000 times. Some of the original FoS names were rather long and thus abbreviated in this plot. The abbreviated FoS names with their original names can be found in Table A1 in the Appendix.

As mentioned above, eight of the 292 level-1 FoSs present in *MAG* are missing in *OpenAlex*. Their numbers of documents in *MAG* are given in Table 14. Especially, the removal of the two most populated FoSs Analytical chemistry and Pattern recognition with nearly 2 resp. 1.5 million papers in *MAG* is surprising.

Figure 5 displays the numbers of their level-1-FoS assignments in *OpenAlex* occurring at least 30,000 times. Therefore, Ceramic materials is not shown. A first look reveals mostly reclassifications to closely related FoSs.

4. Discussion and conclusions

OpenAlex has transferred practically all works from *MAG* preserving their bibliographic data publication year, volume, first and last page, DOI, and the number of references that are important ingredients for citation analysis.

Table 14. Number of documents in MAG of the eight in *OpenAlex* missing level-1 FoSs

Missing level-1 FoS in *OpenAlex*	#Documents in *MAG*
Algebra	398,751
Analytical chemistry	1,989,709
Calculus	205,406
Ceramic materials	725
Control theory	967,322
Hydrology	524,127
Pattern recognition	1,417,305
Topology	277,926

More than 90% of the *MAG* documents have equivalent document types in *OpenAlex*. Of the remaining ones, especially reclassifications to the *OpenAlex* document types *journal-article* and *book-chapter* seem to be correct and amount to
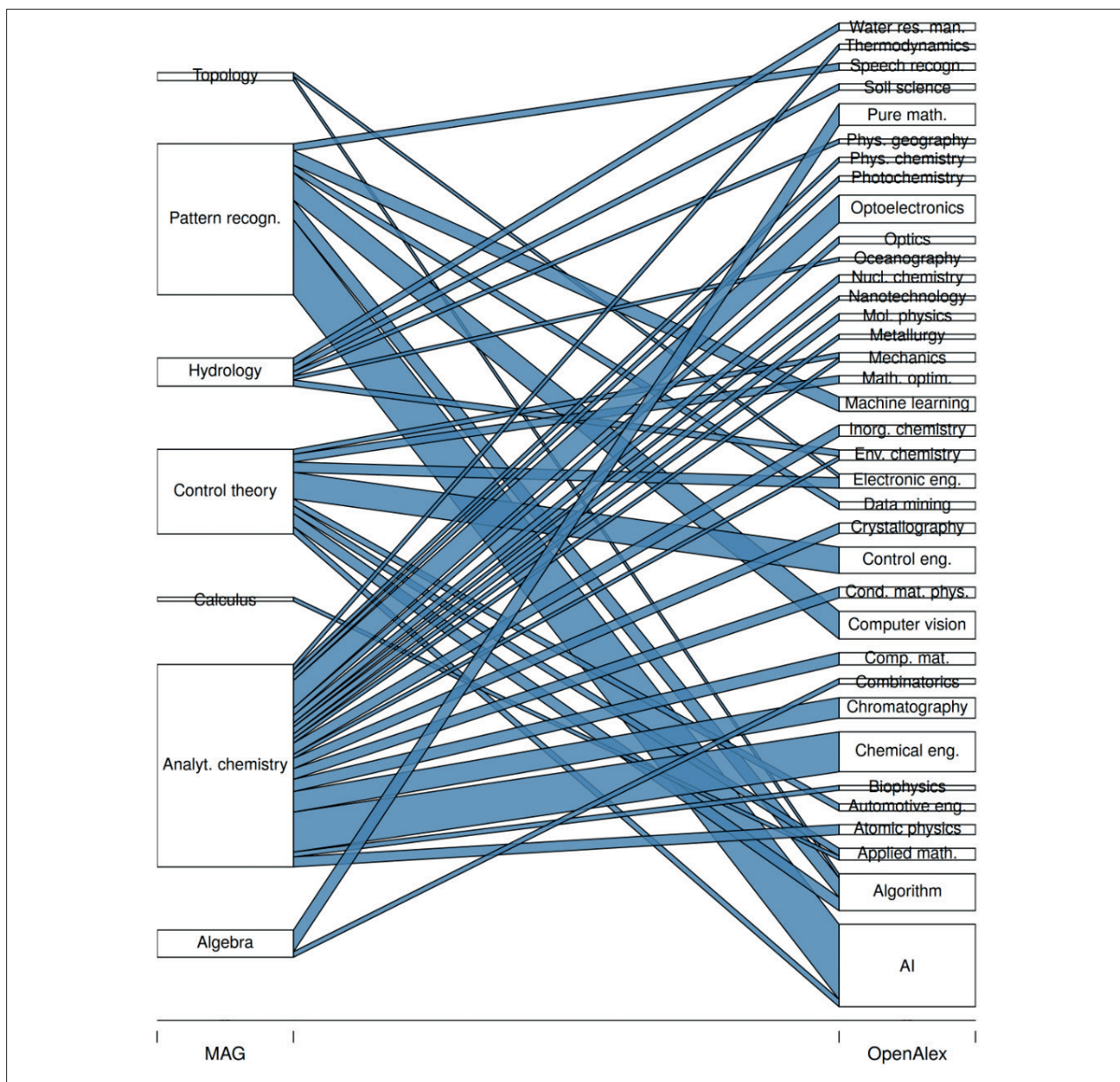
Figure 5. Alluvial diagram for the reclassifications of the eight in *OpenAlex* missing level-1 FoSs from MAG to *OpenAlex*, showing only reclassifications that occur at least 30,000 times. Some of the original FoS names were rather long and thus abbreviated in this plot. The abbreviated FoS names with their original names can be found in Table A1 in the Appendix.

more than 7%, so that the document type specifications have improved significantly from *MAG* to *OpenAlex*. So far, *OpenAlex* seems to be more suited for bibliometric analyses than *MAG*.

As last item of bibliometric relevant metadata, we looked at the paper-based subject classification to FoSs in *MAG* and in *OpenAlex*. We found significantly more documents with a FoS assignment in *OpenAlex* than in *MAG*. On the top level and on level 1, the FoS structure is identical resp. nearly identical, but on the deeper levels the number of available FoSs is drastically reduced to about 10%. A striking feature on the top level is the proliferation and abundant reclassification of the 19 FoSs –very unevenly distributed among them.

This is also the case for a random sample used to assess the suitability of FoS assignments in both databases. On level 1, the reclassifications of FoSs seem to be much more symmetric and the missing eight FoSs to be distributed to closely related ones so that the net effect on the conclusions drawn from previous bibliometric analyses using level-1 FoSs, as by **Scheidsteger** *et al.* (2018), might be small. But that still needs to be investigated as

> Eight level-1 fields of study (Algebra, Analytical chemistry, Calculus, Ceramic materials, Control theory, Hydrology, Pattern recognition, Topology) out of 292 present in *Microsoft Academic Graph* are missing in *OpenAlex*

well as the consequences of *OurResearch* switching to model V2, a different subject classification algorithm, during the year 2022, that promised to bring a substantial improvement (**Priem**; **Piwowar**, 2022).

Overall, *OpenAlex* seems to be at least as suited for bibliometric analyses as *MAG* for publication years before 2021. However, this first impression needs to be checked by further detailed studies.

> In *OpenAlex*, the total number of papers with any field of study is significantly increased and the number of assignments per paper to a top-level field of study is also drastically increased

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6. Appendix

Table A1. List of abbreviations of level-1-FoS names used in the alluvial plots Figure 4 and Figure 5

Abbreviated FoS name	Original FoS name
AI	Artificial Intelligence
Analyt. chemistry	Analytical chemistry
Applied math.	Applied mathematics
Automotive eng.	Automotive engineering
Chemical eng.	Chemical engineering
Clin. psychology	Clinical psychology
Comp. mat.	Composite material
Cond. mat. phys.	Condensed matter physics
Control eng.	Control engineering
Discrete math.	Discrete mathematics
Electronic eng.	Electronic engineering
Env. chemistry	Environmental chemistry
Inorg. chemistry	Inorganic chemistry
Int. care med.	Intensive care medicine
Math. analysis	Mathematical analysis
Math. education	Mathematical education
Math. optim.	Mathematical optimization
Med. chemistry	Medicinal chemistry
Med. education	Medical education
Mol. biology	Molecular biology
Mol. physics	Molecular physics
Nucl. chemistry	Nuclear chemistry
Org. chemistry	Organic chemistry
Pattern recogn.	Pattern recognition
Phys. chemistry	Physical chemistry
Phys. geography	Physical geography
Polym. chemistry	Polymer chemistry
Pure math.	Pure mathematics
Speech recogn.	Speech recognition
Structural eng.	Structural engineering
Water res. man.	Water resource management

Altmetrics can capture research evidence: an analysis across types of studies in COVID-19 literature

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Abstract

COVID-19 has greatly impacted science. It has become a global research front that constitutes a unique phenomenon of interest for the scientometric community. Accordingly, there has been a proliferation of descriptive studies on COVID-19 papers using altmetrics. Social media metrics serve to elucidate how research is shared and discussed, and one of the key points is to determine which factors are well-conditioned altmetric values. The main objective of this study is to analyze whether the altmetric mentions of COVID-19 medical studies are associated with the type of study and its level of evidence. Data were collected from the *PubMed* and *Altmetric.com* databases. A total of 16,672 publications by study types (e.g., case reports, clinical trials, or meta-analyses) that were published in the year 2021 and that had at least one altmetric mention were retrieved. The altmetric indicators considered were *Altmetric Attention Score* (AAS), news mentions, *Twitter* mentions, and *Mendeley* readers. Once the dataset of COVID-19 had been created, the first step was to carry out a descriptive study. Then, a normality hypothesis was evaluated by means of the Kolmogorov–Smirnov test, and since this was significant in all cases, the overall comparison of groups was performed using the nonparametric Kruskal–Wallis test. When this test rejected the null hypothesis, pairwise comparisons were performed with the Mann–Whitney U test, and the intensity of the possible association was measured using Cramer's V coefficient. The results suggest that the data do not fit a normal distribution. The Mann–Whitney U test revealed coincidences in five groups of study types: The altmetric indicator with most coincidences was news mentions, and the study types with the most co-incidences were the systematic reviews together with the meta-analyses, which coincided with four altmetric indicators. Likewise, between the study types and the altmetric indicators, a weak but significant association was observed through the chi-square and Cramer's V. It can thus be concluded that the positive association between altmetrics and study types in medicine could reflect the level of the "pyramid" of scientific evidence.

Keywords

COVID-19; Pandemics; Altmetrics; Social media metrics; Social media; Social networks; *Twitter*; News; *Mendeley*; Citations; Bibliometrics; Scientific publication; Study type; *PubMed*; *Altmetric.com*.

1. Introduction

COVID-19 has affected society worldwide as an unprecedented challenge (**Chriscaden**, 2020). The fact that this exceptional situation has greatly impacted science is attested to by an exponential explosion of scientific literature (**Torres-Salinas**, 2020; **Torres-Salinas** *et al.*, 2020). Along with the increase in publications, there were international calls for cooperation and openness of research to find a solution. This meant a unique opportunity for an open science revolution, which eventually faded away (**Brainard**, 2021). In addition, given the global impact of the pandemic and its effects on multiple aspects of society, COVID-19 attracted the attention of researchers in areas beyond medicine from the very beginning (**Aristovnik** *et al.*, 2020). Thus, COVID-19 has become a consolidated global research front, of great interest to the scientometric community, among others.

Bibliometric properties of this explosion of publications have been studied in detail, and particularities have been highlighted; **Zhang** *et al.* (2020) studied the early global response of researchers in comparison with other outbreaks; **Nane** *et al.* (2022) developed predictive models of expected publications to show the exceptional growth patterns of the scientific literature on COVID-19; **Pinho-Gomes** *et al.* (2020) analyzed the gender gap in the early literature and found that only a third of the authors were women; **Zhang** *et al.* (2021) detected certain changes in research interests after the pandemic peak, while others resume previous research lines. Furthermore, the impact of these new publications on bibliometric indicators has been studied (**Fassin**, 2021). There has also been a proliferation of descriptive studies examining new sources and datasets related to COVID-19. For instance, **Colavizza** *et al.* (2021) explored and detailed the content of new bibliographic data sources, whereas **Kousha** and **Thelwall** (2020) compared the coverage of the scholarly databases on COVID-19 publications, pointing to *Dimensions* as the most comprehensive.

Furthermore, different proposals have been developed to understand how these new publications are shared and discussed in different social media through "altmetrics" (**Priem**, 2014). These social media metrics have proven useful for understanding aspects of science communication beyond traditional channels (**Arroyo-Machado** *et al.*, 2021). Regarding COVID-19-related research, **Kousha** and **Thelwall** (2020) studied the altmetric impact of COVID-19 publications on different social media platforms and found that early altmetric mentions such as tweets reflect a positive relationship with later citations. *Twitter*, in particular, is one of the main social media studied; it has been the object of numerous studies exploring diverse communities of users and interactions produced around anti-vaccine movements and disinformation (**Hayawi** *et al.*, 2022; **Marcec**; **Likic**, 2022; **Van-Schalkwyk** *et al.*, 2020). Despite the risks on *Twitter*, **Haunschild** and **Bornmann** (2021) saw its potential as an early warning system for identifying potentially problematic information. Beyond *Twitter*, there are also other suggestions. **Fraumann** and **Colavizza** (2022) reviewed and identified the important role that both news and blogs have played in science communication during the pandemic. In addition, **Colavizza** (2020) observed efforts by the *Wikipedia* community to incorporate the main research findings by referencing relevant publications.

The exceptionality of this situation resulting from the pandemic has thus been demonstrated, showing remarkable differences compared with other related phenomena, or already known patterns. There are differences between the various types of medical research outputs and the impact or attention they receive; one example is the role played by preprints (**Majumder**; **Mandl**, 2020; **Van-Schalkwyk**; **Dudek**, 2022). From the beginning of the pandemic, despite the fact that it marked a period in which studies focused so much on a single topic, there was considerable concern that the content and quality of this research might not meet public health needs (**Odone** *et al.*, 2020). This concern eventually became a reality; it was found that the quality and evidence of the study types of many papers was below the usual standards (**Jung** *et al.*, 2021). Therefore, the COVID-19 publications could provide an opportunity to study whether the characteristics, especially the type of medical research study, are related to the attention they receive in the main social media. In other words, the metric differences that may exist between, for example, a "case report" or a "clinical trial" could be studied.

This is possible because the field of Health Sciences has a classification of typologies, in which differences in scientific evidence and clinical value can be found (**Röhrig** *et al.*, 2009). Databases such as *Embase* or *Medline* classify their articles according to study type. It have been demonstrated that the study type is associated with the citation rates (**Okike** *et*

al., 2011; **Patsopoulos** *et al.*, 2005). For example, this phenomenon occurs with systematic reviews that received double the number of citations compared with nonsystematic reviews (**Bhandari** *et al.*, 2004; **Montori** *et al.*, 2003). Regarding altmetrics, a similar relationship has also been found between mentions and document type, as is the case with editorial materials, which have received a high level of attention on social media despite rarely being cited (**Haustein**; **Costas**; **Larivière**, 2015). But there is no literature that explores the impact that the research study type and evidence level may have on altmetric mentions. Our main objective is to analyze whether the altmetric attention received by COVID-19 medical studies is associated with the research study type and evidence level. To achieve this main objective, the following specific objectives were set:

1. Calculate the most relevant altmetrics for the papers published on COVID-19, considering the type of study as the main variable

2. Determine through different statistical tests if there are significant differences in the values observed in each type of study

3. Perform a ranking of the different types of studies considering their altmetrics and compare them with the traditional evidence pyramids

This paper is an considerable expansion of a preliminary study presented at the *STI 2022* (**Valderrama**; **Torres-Salinas**, 2022).

2. Methodology

We collected data from two sources: *PubMed* and *Altmetric.com*. Data were retrieved on November 21, 2022. Firstly, *PubMed* was used to retrieve the bibliographic records of the COVID-19 scholarly outputs published in the year 2021. Specifically, the search was carried out through *PubMed Clinical Queries*, using the following query:

(COVID-19[MeSH Terms] OR SARS-CoV-2[MeSH Terms] OR coronavirus [MeSH Terms]) AND ("2021/01/01"[Date - Publication]: "2021/12/31"[Date - Publication])

This search resulted in a total of 93,024 publications that were classified according to the study types that were assigned directly by the publishers or the Index Section of the National Library of Medicine (NLM). For our aims, the following study types were considered: (1) case reports, (2) clinical trials, (3) consensus development conferences and guidelines, (4) reviews (all those that were systematic review were omitted), (5) systematic reviews, (6) meta-analyses, and (7) observational studies. This reduced the total number of publications to 20,668. The distribution of publications by study type was unequal, with the majority being reviews (9,873), followed in smaller numbers by case reports (4,254) and observational studies (3,117). After this came systematic reviews (2,101), meta-analyses (1,358), and clinical trials (1,325), and in last place consensus development conferences and guidelines (143).

Mentions were retrieved using *Altmetric.com* using the digital object identifier (DOI). *Altmetric.com* had indexed 16,672 from *PubMed* that had at least one mention. Regarding the selection of social media metrics, it is necessary to point out a common problem in such studies –the unequal number of metrics counted by source (**Zahedi** *et al*., 2014). First, we removed some sources according to the following criteria: (a) platforms with an irrelevant number of mentions (e.g., *YouTube* or *Stack Overflow*, (b) platforms with a strong geographical component (e.g., *Weibo* and *Reddit*), and (c) platforms that no longer exist or do not work (e.g., *LinkedIn*, *Google+*, *Sina Weibo*, and *Pinterest*). Second, to ensure statistical validity, a threshold of 30% of publications with at least one mention was established. Finally, the metrics selected were: news mentions, *Twitter* mentions, and *Mendeley* readers. Likewise, *Dimensions* citations were considered so that a comparison with traditional bibliometric indicators could be undertaken.

Descriptive statistics were used to study the distribution and establish significant differences in altmetric mentions by type of study. First, we applied the Kruskal–Wallis test to contrast the hypothesis of equality of the medians between the variables to identify potential differences in performance (**Samuels** *et al.*, 2011). Second, pairwise comparisons were carried out using the Mann–Whitney *U* test to check whether there were significant differences between two variables; for this purpose, the test calculated the *U* value. Finally, we used a test of independence based on the chi-square statistic on the contingency table of joint frequencies generated by the Mann–Whitney test, such that, when $p < 0.05$, we could conclude that there was a similarity between two variables, and therefore a similar level of evidence.

3. Results

3.1. Descriptive analysis

The cumulative sums of values by metric and study type are shown in Figure 1, where it can be clearly seen that reviews had the highest values for all metrics except for news mentions. This can be explained by the fact that it was the most abundant study type, representing 49% of the publications with altmetrics that were studied. After the reviews, clinical trials stood out in terms of *Altmetric Attention Score* (AAS) and *Twitter* mentions. In the rest of the study types, the altmetrics showed a similar dynamic.
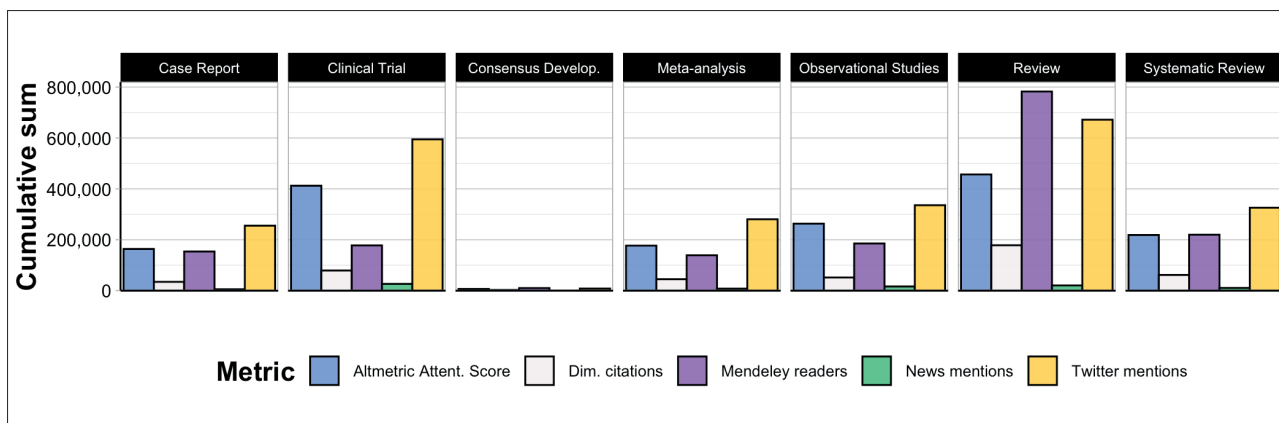
Figure 1. Cumulative sums of values by metric and study type of COVID-19 publications

Table 1. Descriptive statistics of COVID-19 publications and their metrics by study type

General metrics			Median values (interquartile range)				
Study type according *PubMed* database	Number of publications	Publications with mentions	*Altmetric Attention Score*	News mentions	*Twitter* mentions	*Mendeley* readers	*Dimensions* citations
1. Case report	4,254	2,984	4 (1-14)	0 (0-1)	3 (1-16)	37 (22-59)	5 (1-12)
2. Clinical trial	1,325	1,169	12 (4-82)	0 (0-3)	10 (3-61)	87 (51-152)	13 (5-39)
3. Meta-analysis	1,358	1,196	10 (3-37)	0 (0-1)	10 (4-35)	75 (43-137)	17 (8-38)
4. Observational studies	3,117	2,460	7 (2-24)	0 (0-1)	6 (2-24)	55 (32-90)	9 (3-19)
5. Consensus development	143	117	14 (4-49)	0 (0-2)	15 (2-50)	63 (35-113)	9 (3-22)
6. Systematic review	2,101	1,885	9 (3-33)	0 (0-1)	10 (4-33)	79 (46-136.75)	15 (6-34)
7. Review	9,873	8,177	7 (2-19)	0 (0-1)	5 (2-20)	59 (34-104)	9 (3-21)
All	20,668	16,672	7 (2-22)	0 (0-1)	6 (2-24)	57 (33-101)	9 (3-22)

In general, clinical trials and consensus development conferences and guidelines were the study types with the highest medians. It is noteworthy how clinical trials stood out in news mentions and *Mendeley* readers, while the consensus development conferences and guidelines had the highest median values in terms of *Altmetric Attention Score* and *Twitter* mentions. However, it should be noted that the number of clinical trials (1,325) was much higher than that of consensus development conferences and guidelines (143). Another study type that stood out in terms of altmetrics was meta-analyses. Having a median value of 10 in both the *Altmetric Attention Score* and *Twitter* mentions, as well as the third highest median of *Mendeley* readers (75), showed that this study type's social attention is not restricted to a single altmetric source or a specific social community. The altmetric values of meta-analyses followed very similar patterns to those of systematic reviews, the latter being the second type with the best median value in *Mendeley* readers (79). In contrast, there were the case reports, which, although there were many such publications (4,354), had the lowest medians for all altmetrics. Finally, it could be mentioned that meta-analyses and systematic reviews were not only the most cited study types but also had the highest medians in terms of *Twitter* mentions and *Mendeley* readers.

3.2. Statistical differences between the types of studies

Comparisons were then made between the metrics of the seven study types to analyze how the selected metrics performed according to each study type. This comparison was done by means of the Kruskal–Wallis test, resulting in $p < 0.001$; this means that there were significant differences between the metrics of each type of study. The Kruskal–Wallis test confirmed the results observed in Table 1 and Figure 1, as it indicated that altmetrics presented very different values depending on the type of study. A cross-tabulation of coincidences between study type and metrics, collecting the p-values of the Mann–Whitney U test, is shown in Table 2. As can be seen, the altmetric indicator that had the most coincidences within the study types was news mentions, whose number of coincidences was 7, followed by *Twitter* mentions, with a total of 5 coincidences. *Mendeley* readers showed the lowest number of matches. Within the study types, the p-values of consensus development conferences and guidelines were found to match for at least five study

types. It was followed by the systematic reviews and observational studies, each having coincidences with another four study types, including the grouping of both. It is noteworthy that the systematic review and meta-analysis groups had the same values for *Altmetric Attention Score*, *Twitter* mentions, news mentions, and *Mendeley* readers. This indicate that these types of studies have a relevant role. Finally, the chi-square test of independence was applied. In this hypothesis test, the null hypothesis (H0) was that there would be no relationship between study type and metrics, while the alternative hypothesis (H1) was that there would be a relationship between study type and metrics. The test result was significant ($\chi^2 = 294,569.85$; $p < 0.001$).

Table 2. Cross-tabulation of coincidences between altmetric indicators by study type, grouped two by two

	Altmetric Attention Score	Twitter mentions	News mentions	*Mendeley* readers	*Dimensions* citations
Meta-analysis	0.415	0.831	0.932	0.192	–
Systematic review					
Meta-analysis	0.229	0.377	0.325	–	–
Consensus development					
Clinical trial	0.415	0.990	0.090	–	–
Consensus development					
Consensus development	0.182	0.284	0.288	–	–
Systematic review					
Observational study	–	–	0.086	0.084	0.814
Consensus development					
Clinical trial	–	0.094	–	–	0.137
Systematic review					
Consensus development	–	–	–	0.604	0.985
Review					
Meta-analysis	–	–	0.105	–	–
Observational study					
Observational study	–	–	0.072	–	–
Systematic review					
Observational study	–	–	–	–	0.211
Review					

4. Discussion and conclusion

In this paper we focused on the altmetrics of COVID-19 studies published in 2021, using the main types of medical studies to analyze the differences between them. The results indicated that altmetrics in health science research, specifically on the COVID-19 research front, may be highly determined by the type of research study; conversely, they suggested that altmetrics can capture the utility of the research explored here. In medicine and especially in evidence-based medicine, the usefulness of academic papers is linked to the evidence of their results and their practical application in the clinical world. One way to visualize utility is through the pyramid of scientific evidence, in which studies are assigned to levels of evidence based on their methodology. The evidence pyramid is an easy way to visualize the most valuable information within this hierarchy of evidence (**Arsenault**, 2022). For example, in Figure 2A we have included a pyramid from the *University of Washington Health Sciences Library* (**Kowalczyk**; **Truluck**, 2013; **Murad** *et al.*, 2016). It can clearly be seen how the types of studies are ordered, with the consensus development conferences and guidelines being on the top. In this way, a pyramid of evidence (Figure 2B) was created using the quantitative data obtained in results; specifically, we have ordered study types using the values of the *Altmetric Attention Score* included in Table 2.

As can be seen, both pyramids are essentially the same, with the main difference being the clinical trials, which are in third place in the *University of Washington* pyramid but in second place in the one produced from the *Altmetric Attention Scores*. If we compare the results generated quantitatively with altmetrics with other pyramids of evidence generated by specialists (**Arieta-Miranda** *et al.*, 2022; **Murad** *et al.*, 2016), the similarities are more than reasonable. This is explained by the fact that altmetrics capture the social attention that publications receive, so the typologies most closely related to society, at least the most useful ones, are likely to receive more attention on social platforms. For example, consensus development conferences and guidelines are a way to bring together citizens, decision-makers, and an array of experts to address issues of public importance; clinical trials are situated at the peak since their results are highly valid (**Lazcano-Ponce** *et al.*, 2004); and meta-analysis is the statistical process of analyzing and combining results from several similar studies (**Harris** *et al.*, 2014). Reviews (5), in addition to their educational component, are hypothesis generators, which are very important when analyzing a new topic such as COVID-19 (**Valderrama** *et al.*, 2021).
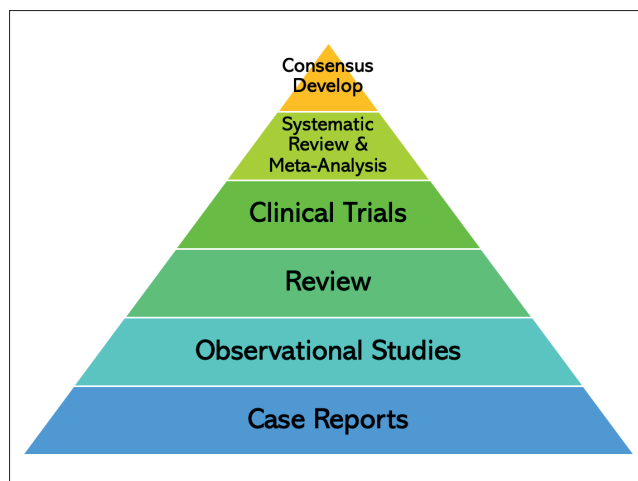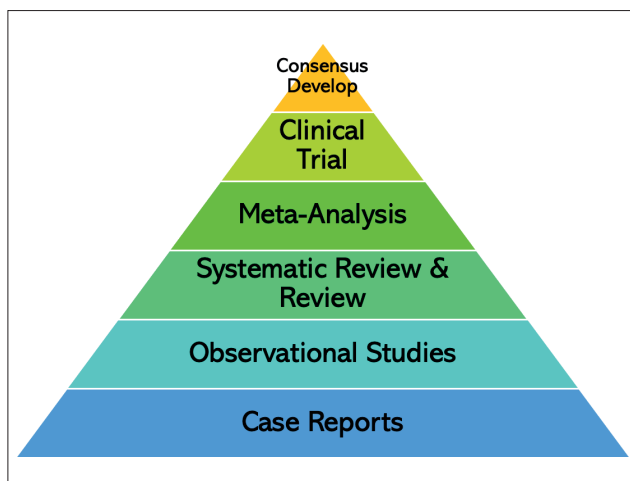
Figure 2A. *University of Washington Health Sciences Library*

Figure 2B. Pyramid adapted from the value of the *Altmetric Attention Score* presented in Table 2

We can conclude that, depending on the type of study, altmetrics reach different values and that, in addition, these values are able to capture the usefulness and evidence of the studies, as we have seen when comparing our results with the pyramids of evidence. These are results that provide empirical evidence on the possible meaning of altmetrics and open the doors to their application in evaluative bibliometrics, at least in the field of health sciences. This study is not without limitations. Altmetrics from only three social media outlets were considered; one of these altmetrics was news mentions, which were present in approximately one-third of the publications studied. Similarly, despite a high volume of COVID-19 publications, only a single year's publication period was used. For this reason, future work should explore this relationship between study type and altmetrics in the medical field beyond COVID-19 studies.

5. Note

This study is based on a communication presented at the *STI2022* conference in Granada, Spain, but it has been fully reviewed:
https://doi.org/10.5281/zenodo.6957471

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Gender perspective advances in the media: initiatives for its incorporation into the Spanish press

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Abstract

Incorporating a gender perspective in the media entails implementing strategies to work with information in a democratic way. The mobilisation of *Las Periodistas Paramos* in Spain in 2018 influenced a change towards such a perspective, which is also one of the most relevant innovations identified in Spanish media. The purpose of this work is to draw, for the first time, a map of the initiatives adopted by the Spanish press to incorporate the gender perspective into its newsrooms. To do this, style guides and other initiatives aimed at providing guidance on the introduction of the gender dimension are examined, and semi-structured interviews are used to find out how four women journalists responsible for such an incorporation carry out their work. The results show a substantial, although also uneven, presence of initiatives in the 21 newspapers analysed. Most of the style guides –10 of them have one and nine of them have been accessed– are outdated, obsolete or being updated. Most also contain aspects related to the gender perspective, although they do not include this term explicitly and often do not adapt to today's reality. In the newspapers that do not have a Style Guide or other types of measures, a sensitivity towards the subject is perceived. On the other hand, four newspapers have a gender editor whose main function is to ensure that the perspective is transversal and reaches all sections, genres and content. These professionals make a positive assessment of their still brief trajectory and agree that journalism has advanced considerably and done important pedagogical work in society in terms of gender, although it seems that this figure will remain necessary for quite some time.

Keywords

1. Introduction

The media play a crucial role in shaping public opinion and are powerful instruments in bringing about social change (**Gallego-Ayala**, 2015, p. 19). Their alliance with feminism is therefore of vital importance in societal re-education, the changing of gender role stereotypes and the elimination of gender-based discrimination (**Williams**, 2000). However, the media also reflect the cognitive foundations of society within a system where inequality reigns (**Meuli**, 2017), and improving the presence of women in political-media discourse has thus been suggested as a way to democratically strengthen their symbolic and substantive representation (**Padovani** *et al.*, 2022).

The underrepresentation and invisibility of women in media content and the limitations they experience in attaining decision-making positions in media organisations have been on the international agenda since the mid-1990s (**Padovani** *et al.*, 2022). The *Fourth World Conference on Women* (*United Nations*, 1995), held in Beijing in 1995, included among its objectives

> "increasing women's participation and access to expression and decision-making in and through the media"

and

> "promoting a balanced and non-stereotyped portrayal of women in the media."

It also called on governments, the media, and the research community to promote more gender-balanced media content and structures, and even noted the existence of a link between communication, gender equality and democracy. More than twenty-five years later, the 2021 *Media for Democracy Monitor Project* (*MDM*) described the persistence of inequalities in many areas of the media as being a democratic challenge (**Trappel**; **Tomaz**, 2021). Furthermore, the *Council of Europe* has required the European media industry to make increasing efforts to improve its structures and products (**Mannila**, 2017, p. 5) in the face of widespread discrimination and gender inequality in this sector (**McCracken** *et al.*, 2018).

In Spain, the *Gender Violence law* and *Equality law* of 2004 and 2007, respectively, had already established the media's responsibility in gender issues. On March 8, 2018, female journalists launched the *Las Periodistas Paramos* movement (*LPP – We, the women journalists, stop*), an initiative that brought to light demands they had regarding their work situation and the role of women in newsrooms and media content (*Las Periodistas Paramos*, 2018). Amongst other things, the *LPP* demanded new approaches, including the presentation of news with a gender perspective, and this at a time when significant changes were already starting to be noted (**Prieto-Sánchez**, 2018). Although these changes have not yet been fully implemented across all media outlets, they provide evidence of the social transformation that can be brought about by collective actions (**Sánchez-Mora**; **Rodríguez-Lara**, 2015).

However, the latest Spanish *Annual Report on the Journalistic Profession* finds that female journalists continue to encounter difficulties in reconciling work and family life, in achieving promotions, and in reaching managerial positions (*Asociación de la Prensa de Madrid*, 2021). In view of this,

> "it is unlikely that the media can contribute to fostering gender equality, and therefore to strengthening democratic practices, unless they assume gender equality as a basic principle of their operation" (**Padovani** *et al.*, 2022).

Consequently, the purpose of this paper is to examine the initiatives adopted by the Spanish press to incorporate the gender perspective into their newsrooms, thus complementing existing studies on the working conditions of female journalists which, although indirectly, also have an impact on this perspective.

2. Literature review

2.1. Women in the media

Gender studies oriented towards the role of women in the media can be divided into two categories, the first of which has a direct influence on the second: (a) gender issues in newsrooms (inequality in job opportunities, promotion, salary, and sexism) and (b) the representation of women in the media (**Steiner**, 2017). Within the first category, the existence of labor inequality between male and female journalists has been noted in Spain for decades (among others, **Franquet**, 1982; **Fagoaga**; **Secanella**, 1984; **Gallego-Ayala** *et al.*, 1998; **Soriano**, 2005; **Garrido**, 2008; **Martínez-Rodríguez**, 2014; **García-Sáiz**, 2018; **De-Miguel-Pascual**; **Parratt-Fernández**; **Berganza-Conde**, 2019; **Iranzo-Cabrera**, 2020; **Cáceres**; **Parratt**, 2021). We also find studies within this first category, though somewhat scarcer, on the journalist as a content producer (among others, **Ufarte**, 2007; **De-Miguel** *et al.* 2017; **Cáceres**; **Parratt**, 2022).

As for the second category, it was not until the 1990s that the production of scientific work related to the image of women in the media began to gain strength in Spain (**De-Pablos-Coello** *et al.*, 2005). Numerous studies have provided evidence both of the invisibility of women and the influence of male stereotypes in media content (e.g., **García-de-Cortázar-Álvarez**; **García-de-León-Nebreda**, 2000; **Sánchez-Aranda**; **Berganza-Conde**; **García-Ortega**, 2003; **Gallego-Ayala**, 2003; **Blanco-Castilla**, 2005; **Gómez-y-Patiño**, 2011, among others). The *MDM* confirmed in 2021 that, with rare exceptions –Nordic countries[1] and, more recently, the United Kingdom and Germany– women are still poorly represented, rarely appear as expert voices, are often excluded from economic and political news (**Padovani** *et al.*, 2022) and front pages (**Franks**, 2013), and are overrepresented in health, cosmetics, or design issues (**Edström**; **Mølster**, 2014, p. 66). In Spain, women´s opinions are relegated to places of less informative relevance (**Prieto-Sánchez**, 2018) and micro-sexism

is still detected in the representation of gender roles, sexist language or female hypersexualization (**Peralta-García** *et al.*, 2019, p. 181). Sports pieces, too, continue to contain sexist biases and present an androcentric view (**Mayoral-Sánchez**; **Mera-Fernández**, 2017; **Ramon-Vegas** *et al.*, 2020), and while there has been an increase in the coverage of gender violence (**Zurbano-Berenguer**; **García-Gordillo**, 2016), this for years has transmitted the role historically granted to women by society (**Bach-Arús**, 2000, p. 115), from a viewpoint of "morbid sensationalism" (**Fraga**, 2007) and a "non-existent gender perspective" (**Soria-Ibáñez**, 2016, pp. 149-150).

Following in the wake of **Van-Zoonen** (1998), other recent works have focused on the relationship between the absence of women in positions of responsibility in the media and news content[2] –which relegates gender issues to second place– and news with female sources (**Prieto-Sánchez**, 2018). In this sense, journalism with a gender perspective would positively affect both the construction of the journalistic text and the context in which it is produced (**Oliveira**, 2020, p. 18).

2.2. The gender perspective

Gender is not a topic, but a focus of social communication

"that has been mutating in the last thirty years in the light of changing social contexts" (**Actis**; **Gariglio**, 2021).

Currently, the adoption of gender perspective in the media involves implementing strategies for the presentation of information in a democratic way, thus promoting equality in the process of news construction (**Alberti-Garfias** *et al.*, 2010). The mobilization of *LPP* in 2018 was the impulse for a change towards that perspective (**Galarza-Fernández**; **Castro-Martínez**; **Sosa-Valcárcel**, 2019). This has been one of the most relevant innovations seen in the Spanish media and is evidenced by the inclusion of feminism in the editorial principles and in the production of content with a feminist approach in sections on equality (**Carvajal** *et al.*, 2022). Ana Requena, editor-in-chief of gender at *eldiario.es*, explains that

"until recently, the readership was very masculinized, now (...) you have an audience to attract who will not accept that women are systematically ignored, that only men are given columns, or (the publication of) deplorable depictions of gender violence" (*Diario Digital Femenino*, 2020).

Introducing gender perspective into reporting involves

"getting to the bottom of journalistic discourse, questioning some conventions and apparently immovable principles, and unveiling in a critical but constructive way the unfavourable mechanisms through which a discourse is presented as regards the needs and the equitable treatment of news" (**Gallego-Ayala**, 2015).

Although these adjustments are not always simple, partly because the male professionals who manage news content are not trained in this regard (**Soria-Ibáñez**, 2016), they should occur naturally and democratically (**Oliveira**, 2020, p. 21), and in all types of news coverage, not only when stories about women are being covered (**Sharma**, 2012, p. 4). To this end, *Unesco* (2019) created the *Gender Sensitive Indicators for Media* for the media to use at their own discretion. Meanwhile some authors prefer self-regulation and the implementation of their own actions to increase gender awareness in journalism (**Mateos-de-Cabo**; **Gimeno-Nogués**; **Martínez-Martínez**, 2007; **Iranzo-Cabrera**, 2020)

In relation to the latter, the news media use "style guides", a set of internal rules that all staff must abide by, which establish in a generic way how to write for each distinct organisation (**Parratt**; **Paniagua**; **Abejón**, 2017, p. 77), and which must be updated periodically

"taking into account the evolution of social, verbal, visual and symbolic languages" (**Yriart**, 1998, p. 46).

It can be assumed, therefore, that including gender perspective in them would help to break down stereotypes and achieve an "awareness of gender sensitivity" among professionals (**Córdoba-Barquero**, 2020) which, in turn, would be reflected by the content produced. In this regard, a study by **Cáceres** and **Parratt** (2021, p. 39) revealed that women press journalists in Spain hardly receive any guidelines for using inclusive and non-sexist language when reporting. This is not surprising considering that when the study was carried out the newspapers´ style guides did not include any recommendations for reporting on equality or on the treatment of issues that directly affect women. Therefore, it would be necessary to check whether these guides are still in force and whether, if they have been updated, they have modified their contents with relation to the gender perspective.

The publication of manuals or self-regulatory documents regarding the use of inclusive language in the media has increased, however, such as the *Fundéu* (2019) and the *Canary Islands Institute for Equality* guides (**Coronado-Sopeña**, 2019), in addition to previously existing protocols such as the action plan instigated by the *Government of Cantabria* (2007), or the decalogue created specifically by the newspaper *Público* (*publico.es*, 2008) for reporting on gender violence, among others. However, as with the style guide situation, there is not yet any complete and up-to-date information regarding the initiatives taken by the Spanish media in this area.

Other recently adopted changes are the creation of special sections on feminist issues and what is commonly referred to as the gender portfolio, under the direction of individuals occupying roles which are so new that they have hardly been analyzed academically[3]: the gender correspondent, gender editor, gender editor-in-chief or equality specialist –among other titles. These new roles are in charge of acting

"cross-sectionally within the entire newsroom and across all topics in order to promote cultural change and ensure the responsible treatment of news from a gender perspective" (**Lezaeta**; **Latorre**; **Carvalho**, 2020).

The pioneer in the institution of this role was *The New York Times*, in 2017. Its gender editor, Jessica Bennett, refers to this perspective as

> "a lens from which we see the newsroom as a whole (...); more than simply producing new content, it also means thinking about tone, visual presentation, who writes the pieces, who appears in those photographs, what sources are cited" (**Sharma**, 2012, p. 7).

In Spain, *El País* was the first media outlet to create a gender correspondent, in 2018, Pilar Álvarez (*Laboratorio de Periodismo*, 2021), followed by *eldiario.es*, which appointed Ana Requena as editor-in-chief of gender in September of the same year.

However, the creation of this role has not gone uncriticised. **Pérez-Soler** and **Roca-Sales** (2019) hypothesize about a possible opportunistic motivation behind its creation and **Oliveira** (2020, p. 19) argues that

> "commercial interests go further than social responsibility and, thus, the creation of gender editors by large media groups reflects the desire of these newspaper companies to profit from a gender equality agenda."

The new role also faces difficulties. For example, some female editors in the Argentinian media point not only to the efforts needed for the gender perspective to be implemented across the board, but also to the obstacles they encounter in the way of fulfilling their roles with greater autonomy and decision-making power (**Heb**, 2022). These obstacles are justified by those who see the adoption of the gender perspective as a one-off movement and, consequently, that these editors would have

> "a reduced impact because (the gender perspective) is not part of the newspaper's editorial line nor is it proposed by the company as an integral part of the journalistic task" (**Meuli**, 2017).

Finally, it is worth asking whether it would be desirable for this role to exist only until the gender perspective ceases to be

> "an artificial complement, something you do only if you have a boss who insists on it" (**Sharma**, 2012, p. 7)

and instead becomes accepted and normalised across all newsrooms.

3. Objectives

As indicated above, the purpose of this paper is to map, for the first time, the initiatives taken by the press in Spain to incorporate the gender perspective into their editorial offices[4] and to examine the way they operate. We seek to answer the following research questions:

> Q1. Do the style guides of the Spanish press contain directives regarding the gender perspective?
>
> Q2. Does the press have other documents and/or sections aimed at incorporating the gender perspective into newsroom?
>
> Q3. Do newspapers have an individual responsible for incorporating the gender perspective?
>
> Q4. How does this individual carry out their work?

4. Methodology

In order to create a map of the initiatives taken throughout the Spanish press to promote gender perspective in their newsrooms –and thus respond to Q1, Q2 and Q3– we first carried out a survey of news publications. To this end, the most widely read newspapers in Spain were selected. To include digital national news publications, the most recent ranking available at the time this stage of the research began was used –corresponding to the first quarter of 2022– and was provided by *GfK* (*Growth from Knowledge*). From an initial total of 50 titles, economic and sports publications were eliminated, resulting in a final list of 21 general news publications.

Secondly, the newspapers were contacted by telephone and, in some cases, by e-mail between May and July 2022, so as to obtain the information necessary to complete the map. That is, to find out if the publications have style books, and if so, to access and examine them, in order to locate possible guidelines or directions referring to the treatment of gender issues. Another objective was to find out if they have any other documents created specifically to provide guidance on the incorporation of the gender perspective to the publication, as well as other possible initiatives. Three newspapers did not allow access to their style books –*El Español*, *El Mundo* and *La Nueva España*. In the case of the first two, information was obtained by contacting editors on their staff. The examination was carried out using qualitative methodology and the technique of discourse analysis, which made it possible to locate possible guidelines or directions regarding the treatment of these issues. To this end, the following variables were considered in relation to the presence of gender issues:

- sexist language;
- sexist violence;
- attention to equality;
- gender-related terms; and
- indications on gender.

Finally, after confirming that four newspapers have established a role responsible for the gender perspective in their editorial offices, the qualitative technique of the semi-structured interview was used to find out how this work is carried out (Q4). The professionals who occupy this position agreed to be interviewed and to have their answers published for academic purposes. The meetings

> This study´s novelty lies in mapping, for the first time, the initiatives adopted by the Spanish press for the incorporation of the gender perspective into their newsrooms

took place in June 2022 through *Microsoft Teams* and lasted between 47 min. and 01 h 39 min. They were self-transcribed using the tool incorporated into *Teams* for this purpose and were subsequently edited manually to organize the responses according to thematic criteria. The subjects were asked, among other things, about their backgrounds, time spent in their roles, and the initiatives in place behind the creation of their role. Other open-ended questions revolved around their functions, the changes they have achieved since holding the position and the difficulties they face, as well as their opinions as to whether their role is necessary.

5. Results

5.1. Map of initiatives for implementing the gender perspective in the Spanish press

Table 1 shows the map of initiatives taken by the newspapers analysed in this study for the implementation of the gender perspective in their newsrooms, which are developed further in sections 5.2. and 5.3. It contains a list of Spanish newspapers ranked by readership for the first quarter of 2022 according to data provided by *GfK*. For each of these publications, the map shows whether they have a style guide; if they do, the existence of any directives therein regarding the incorporation of the gender perspective is shown. Also shown is whether the publications have other types of initiatives aimed at promoting this perspective; and, finally, whether a specific role has been created to oversee its implementation. Cases where publications have not provided access to documents they claim to have are shown with a dash; those that have not responded at all to any requests for information are shown with a question mark.

Table 1. Initiatives to implement the gender perspective in the Spanish press

Newspaper	Style guide	Gender issues in the style guide	Other initiatives	Specific role
El Mundo	✓			
El País	✓	✓		✓
20 Minutos			✓	
ABC	✓	✓		
La Vanguardia	✓	✓		
El Español			✓	
El Confidencial				
elDiario.es				✓
El Periódico	✓	✓	✓	
OKdiario			—	
La Razón				
The Huffington Post				
Las Provincias	✓	✓	✓	
Público			✓	✓
Heraldo de Aragón	✓	✓		
La Voz de Galicia	✓	✓		
El Nacional.cat				
El Correo	✓	✓		✓
La Nueva España	✓	—	✓	
Libertad Digital	?	?	?	?
Ideal			—	

5.2. Style guides and other initiatives

5.2.1. Style guides

Of the 21 newspapers studied, 10 have style guides, but most of these are outdated. Some are in disuse, such as those of the *ABC* (**Vigara-Tauste**; C*onsejo de Redacción de ABC*, 2001), *La Vanguardia* (**Camps**, 2004), *El Correo* and *Las Provincias* –both from the *Vocento* group (**Martínez-de-Sousa**; *Vocento*, 2003)– and *El Periódico* (*El Periódico de Catalunya*, 2007). Those of *El Mundo* (*El Mundo*, 2008) –also in disuse– and *Heraldo de Aragón* (*Heraldo de Aragón*, 2008) are in the

process of being updated. Meanwhile *El País* published a new edition in 2021 (*El País*, 2021), and in January 2022 *La Voz de Galicia* published the document "Additions and amendments" (*La Voz de Galicia*, 2022) to complement its 2002 guide (**Ríos-Álvarez**; **Faginas-Souto**, 2002). *La Nueva España* and *Ideal* claim, respectively, to have a style guide and a document for internal use, to which they have not provided access.

An exhaustive examination of the books –except for that of *La Nueva España*, to which access was not provided– reveals that, except for *El Mundo*, all of them contain issues related to the gender perspective, although this term is not mentioned explicitly. The following six types of directives appear in an unequal manner (Graph 1): use of sexist language, gender, gender-related terms, treatment of gender violence, attention to equality and authorship of the pieces.
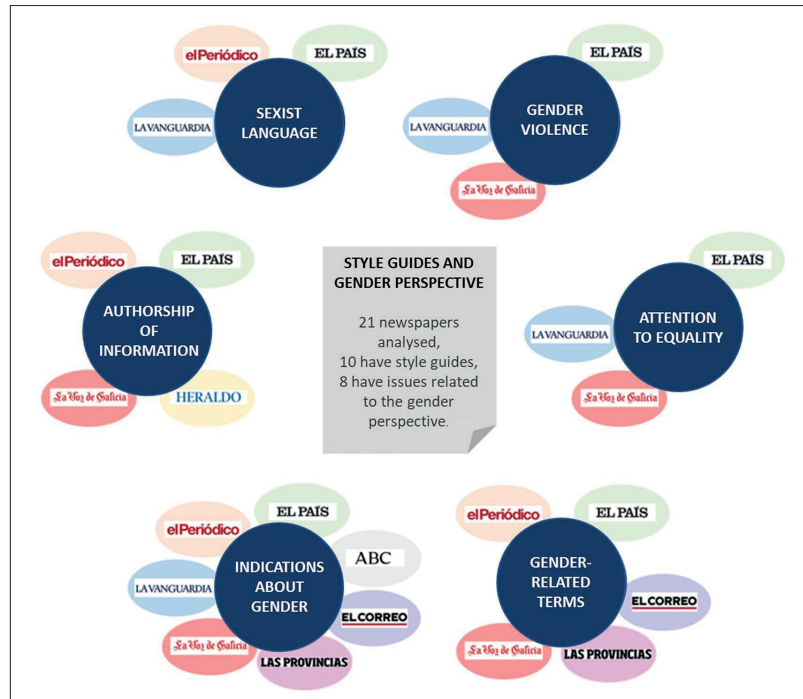
Graph 1. Gender perspective in style guides

Use of sexist language

Allusions to the use of sexist language are present in the style guides of *El Periódico*, *La Vanguardia* and *El País*. While the first says that feminine nouns serve "the purpose of banishing sexist uses of language", although their use is not mandatory (2007, p. 3), the second advises users "to be especially prudent in avoiding linguistic sexism" and not to fall "into artifices of the type "'la jueza, los/as alumnos/as'" typical of "politically correct language" (**Camps**, 2004, p. 32). *El País*' recently updated guide is very different and contains a section with such specific considerations as not giving informative relevance to women's clothing because "it is not more important than that of men" or not only asking women about their work-life balance, but also asking men too (2021, p. 33). This newspaper is the only one that mentions the use of microsexisms, with a definition (p. 470) and some terms to be avoided (p. 35).

Directives about gender

Directives about gender are more frequent. *El País* tries to avoid gender duplications and the generic masculine (2021, pp. 33-34) and *La Vanguardia* speaks of gender instead of sex, "an incorrect Anglicism" (**Camps**, 2004, p. 177). The *ABC* contains clarifications on the gender of nouns that are confusing, where gender/sex is not indicated by word or profession terminations, and also where gender is commonly indicated in the roles and professions held by women (**Vigara-Tauste**, 2001, pp. 84-86). The criteria of *El Periódico* are more conservative, saying that

> "the use of the generic masculine does not go against sexual equality",

although it also

> "expands the list of female voices and includes some which refer to positions, professions or titles that in other times were only associated with men" (*El Periódico de Catalunya*, 2007, p. 8).

The style guide of *La Voz de Galicia* says that when the reference is feminine and the element expressing the whole is masculine, the feminine quantifier is admissible, "but Grammar considers this construction to be very forced" (**Ríos-Álvarez**; **Faginas-Souto**, 2002, p. 65). In its document "Additions and amendments" (2022) it adds that the feminine forms of the names of professions and positions should be used when they exist.

As for *Las Provincias* and *El Correo*, the out-of-use style guide they share points out that

> "another problematic issue are those who prefer (especially unionists and politicians) to mention both genders when addressing a collective",

and so, generally, in these publications,

> "only the traditional form will be used, in which the masculine is a generic representative of both genders."

In addition, the feminine form of trades, positions, and jobs

> "poses a problem because some (...) are in favour of calling themselves *lawyer*, *engineer* (abogado, ingeniero) –with the masculine terminations– instead of the feminine ones, which can be applied freely" (**Martínez-de-Sousa**; *Vocento*, 2003, p. 92).

> '
> The map drawn up by this study shows a considerable, though disparate, presence of initiatives for the implementation of this perspective in the 21 newspapers analysed
> '

Conversely, *El País* opts for use of the feminine in such positions and accepts the forms approved by the Royal Academy of Spanish –*judge*, *councillor* (jueza, concejala) –although it respects the decisions of those writers who do not want to use these terms in their opinion pieces (*El País*, 2021, p. 175).

Gender-related terms

As with non-sexist language, and in line with the social changes experienced in recent years, the use of gender-related terms is covered in several books. *El País* accepts the use of recently coined words –for example, vicarious violence, *mansplaining*, *manspreading*, microsexism, sisterhood or patriarchy– and advises avoiding others such as *gestación subrogada* (surrogate motherhood) –which it considers a euphemism– *lío de faldas* (uproar), *consolador* (dildo), or *mandona* (bossy) (2021, p. 35). For its part, *El Periódico* considers expressions such as gender violence, gender equality or gender perspective incorrect because

> "the masculine and feminine genders are grammatical categories, not to be confused with the masculine or feminine sex, which are biological categories" (2007, p. 123).

El Correo and *Las Provincias* also reject the term gender violence and replace it with domestic, family, or sexist violence (**Martínez-de-Sousa**; *Vocento*, 2003, p. 445). *La Voz de Galicia* simply includes similar concepts (**Ríos-Álvarez**; **Faginas-Souto**, 2002, pp. 65-66), with some minor additions to its document of modifications.

Sexist violence

Despite being a topical issue in the media, sexist violence appears little and unequally in the style books. While *La Vanguardia* rejects "the incorrect modernity of 'gender violence'" (**Camps**, 2004, p. 177), *La Voz de Galicia* alludes briefly to the non-identification of the victims (**Ríos-Álvarez**; **Faginas-Souto**, 2002, p. 10). *El País* is more in keeping with current realities, and is against publishing morbid images of the victims, their social networks, or denigrating images when reporting on prostitution and the trafficking of women. It advises special care in news stories and opinion pieces on male violence because these cases

> "are not events, but rather must be addressed as a structural problem"

and includes a very complete list of criteria to be followed (2021, pp. 30-33).

Attention to equality

Neither is attention to equality mentioned often. For *La Voz de Galicia* it is a "subject of special attention", but without specifying the type of equality (**Ríos-Álvarez**; **Faginas-Souto**, 2002, p. 8), while *La Vanguardia* rejects news stories

> "that involve any type of discrimination for reasons of ideology or religion, sex, race, or social or cultural origin" (**Camps**, 2004, p. 479).

Only *El País* explains that a general awareness has spread of the need for equality between women and men in all legal and social areas, which

> "has not only had repercussions on the lexicon of the news media, but also on their substantive treatment and on the spaces destined to reflect this reality" (2021, p. 13).

Finally, *El País* (2021), *El Periódico* (2007), *Heraldo de Aragón* (2008) and *La Voz de Galicia* (**Ríos-Álvarez**; **Faginas-Souto**, 2002) agree with respect to the authorship of the news in not using a genderless form to refer to the editors, opting instead for "el periodista" (the journalist "el redactor" (the editor) or "los periodistas" (the journalists).

5.2.2. Other initiatives

Apart from style guides, some newspapers have created specific documents with directives regarding the gender perspective in their newsrooms. This is the case with *Público*, which, in addition to the *Mujer* (Woman) section, has the "Guía rápida para escribir sobre violencias y asesinatos machistas" (Quick guide to writing about violence and sexist murders), which states that "gender violence is not an event" (*Público*, n.d., p. 2) and deserves special treatment - and recommends its staff to use the "Taller de comunicación y género" (Communication and gender workshop) of *Oxfam Intermón*: *https://www.informarsobreviolenciamachista.com*

Heraldo de Aragón has at its disposal the ethical code of *Henneo*, the media group to which it belongs, and which promotes

> "equality between men and women in the media (...) around the world, through a program signed with the *European Commission*" (*Henneo*, n.d.).

OKdiario also claims to have an internal code for gender issues, though we were not given access to it.

Other types of actions are the special sections for women *MagasIN*, of *El Español*, and *mujer.es*, of the free newspaper *20 minutos*,

> "one of the first Spanish newspapers to subscribe to the initiative of the *European Parliament Office* in Spain #DóndeEstánEllas (where are the women), which promotes the equal presence of women and men in all types of activities organized by the newspaper" (Samitier, *20 minutos*).

For its part, *El Periódico* collates coverage of feminism together under the label "feminism" and in May 2022 created a weekly newsletter about feminism, *Con Letra de Mujer* (In Women´s Handwriting).

Other newspapers say that, although they do not have specific documents,

> "they are guided by the normal rules of language and talk to each other when a new concept or coverage emerges" (Riestra, *Huffington Post*)

and

> "we try to be sensitive and let common sense prevail" (Gómez, *La Voz de Galicia*).

They also follow the slogan of

> "not getting carried away by alternative currents and preach equality between men and women as a factor of welfare and social development, but without bias" (Montañés, *ABC*),

working with

> "common sense and respect for all people, and their diversity, although (publications) often make mistakes or fall short of their objectives."

5.2. Gender portfolios

The creation of gender portfolios is another of the initiatives adopted by some media to ensure the application of a gender perspective in the newsrooms. At the head of these portfolios is a figure whose name differs according to the type of media –gender correspondent, gender editor-in-chief and gender coordinator, among others– but with a common function: to include gender equality in journalistic texts.

Its recent incorporation to the profession (as previously mentioned, in 2017 *The New York Times* was the first newspaper to create a role as gender editor, while in Spain the pioneer was *El País*, in 2018) may explain the reason why, as far as we have been able to confirm, the position of gender editor exists in only four of the 21 newspapers analysed. These are *El País*, *eldiario.es*, *Público* and *El Correo*. *El Periódico* has an editor specialized in gender (Patricia Martín) who works closely with the rest of the newspapers of the *Prensa Ibérica* group, especially with *El Periódico de España*, which in turn has another specialized editor (Violeta Gallardo). However, neither of the two positions have the responsibilities or are held in as same high esteem as the role considered here.

The need for a professional role in charge of coordinating issues referring to gender equality began to crystallize in the Spanish press in 2018, after the feminist strike of *8M* and the *Las Periodistas Paramos* movement. In May of that year, *El País* created the position of gender correspondent to which Pilar Álvarez was appointed. In September, *eldiario.es* chose Ana Requena as editor-in-chief of gender. A few months earlier, in mid-2017, *Público* had proposed that Marisa Kohan would be the gender coordinator of the newspaper, although she was not officially appointed to this role. For this reason, it is understood that the first Spanish newsroom to have a gender portfolio was *El País*.

As previously mentioned, all four professionals in charge of gender in the newspapers studied were interviewed:

- Isabel Valdés, gender correspondent at *El País* since February 2022, when she replaced Pilar Álvarez;
- Ana Requena, editor-in-chief of gender at *eldiario.es* since 2018;
- Marisa Kohan, gender coordinator at *Público* since 2017; and
- María José Tomé, who in early 2022 became the head of gender at *El Correo*.

Except for Isabel Valdés, all of them are the first to hold these positions in their respective publications.

The reasons

Asked about the reasons that they believe were behind their newspapers´ decisions to incorporate such a role, Valdés and Requena agree in pointing to the two major feminist events of 2018 (*8M* and *LPP*), and also included the #MeToo movement, which had started a year earlier:

> "After the feminist strike of *8M*, the newspaper realized that it needed someone in this role, although I think that at the time it was more of an aesthetic manoeuvre than anything else" (Valdés, *El País*).

> Most of the style guides are outdated, obsolete or being updated, most also contain aspects related to the gender perspective, although they do not include this term explicitly and often do not adapt to today's reality

However, they also point out another important factor: the evolution of the newsrooms themselves. In the case of *El País*, Valdés states that the demands of the female professionals had existed for years, since

> "it is a progressive and left-wing newsroom, where there has always been a gender perspective, with many women and many feminist men."

Similarly, in *eldiario.es*,

> "although social context influenced the decision, journalism with a gender perspective was not alien to us, as it is one of the hallmarks of the newspaper and we already had people working on it" (Requena, *eldiario.es*).

In the case of *Público*, it was an ideological decision solely, taken to assert the newspaper´s position.

> "A process of rethinking and redefining itself had begun and a process which we called 'the flags of *Público*' was undertaken, key issues on which we wanted to focus, such as historical memory, the climate crisis and feminism. And we wanted to reinforce that area of feminism with someone to give it a boost" (Kohan, *Público*).

In *El Correo* it was an initiative of its managing editor, José Miguel Santamaría, responding to the need

> "for half of society to be well represented in the news, and to make better, more comprehensive, and non-exclusive journalism" (Tomé, *El Correo*).

Therefore, the creation of this role in the Spanish media responds to different demands:

a) The demands of society. Although *8M* was the most visible event, there was also

> "a critical mass that had been asking for changes in terms of gender perspective for some time. Thanks to social media, this criticism reached the news media in a clearer, more direct and resounding way" (Requena, *eldiario.es*).

b) The demands of the newspaper staff themselves. It started with the *LPP* movement, but it had already been gradually gathering shape with the conviction that egalitarian journalism was better journalism.

c) Market demands. The existence of a new readership to whom it was necessary to adapt, and the need to incorporate more women into this readership caused

> "from that time onwards, a more conscientious analysis of who our readership were, which even led to a remodelling of the masthead and some sections" (Kohan, *Público*).

Name

To try to define this new role, it is important to remember that there is no one name for it, since in each media outlet it is referred to differently. Thus, in *El País* the position is known as "gender correspondent" because

> "the intention is that she should go beyond the area she covers and reach other sections, that she should be a figure of consultation, of decision at some point..." (Valdés, *El País*).

At *eldiario.es*, the term "gender editor-in-chief" was chosen, to

> "put her on an equal footing with the positions that already existed, (and) so that it is clear that she has the same status as the other editors-in-chief and transfers this idea both within and outside the newsroom" (Requena, *eldiario.es*).

In *El Correo*, she is known as the "gender editor" because "at the end of the day, her function is to edit content" (Tomé, *El Correo*). Finally, at *Público*, she is referred to as the gender coordinator because, according to Kohan, her mission is not to edit texts but to "coordinate and mark strategic lines" (Tomé, *El Correo*).

Defining the position

Despite the different job titles and the reasons that led the different publications to choose one over another, the professionals interviewed coincide in defining their position as being one that takes charge of ensuring that the gender perspective is a cross-sectional issue that reaches across all content in their publications, resolving doubts raised by their colleagues and promoting debates on equality.

The fact that only one person, and not a team, is in charge of the whole gender perspective, implies an enormous workload that is not always possible to take on. According to Requena, a good option, therefore, would be for the person in this role to oversee a team of specialists to assist with the workload, "while also not forgetting idea of transversality." However, she also believes that having one's own team for gender issues could be counterproductive, since

> "it would create the feeling that it is a ghetto and could make the other sections think that, since there is already a group in charge of gender, they can ignore this issue."

Despite acknowledging being overloaded with work and being unable to cover all the tasks they would like to, the participants in this study maintain that the attitude and awareness of their colleagues are a great help:

> "I am lucky to work in a newsroom that is very advanced in this area, which makes everything much easier" (Valdés, *El País*);

"We are a small publication that has been working on this issue since the beginning and the resulting work dynamic across the different sections means I don´t have to be constantly vigilant. In addition, people who join us already have these types of concerns and perspectives, and are eager to apply them" (Requena, *eldiario.es*);

"I work in an environment where there are three key figures who are feminists: the editor-in-chief, the deputy editor and the managing editor, all with a very clear vision on these issues" (Kohan, *Público*).

'Some newspapers have created specific guides to provide guidance on the treatment of gender issues in their content, as well as specific sections on women's issues'

Specific training

Regarding the need for specific training for these roles, all the participants agree. The four interviewees acknowledged that they were self-taught, since when they studied Journalism there were hardly any subjects, masters, or courses on gender. Whether it is gained "by (working in the) profession or academic training" (Requena, *eldiario.es*), they think that this is a task "that cannot be done without knowledge" (Kohan, *Público*) because "important decisions have to be taken for which a solid foundation is needed" (Requena, *eldiario.es*) and because "all the academic research that is being done can be applied (practically) in the day to day work of the newsrooms" (Tomé, *El Correo*). Valdés goes a step further and adds that, in addition, "(the training) has to be feminist."

Is it necessary to be a woman?

And is it necessary to be a woman? Are these roles designed for women, or could a man do the job? There are differences of opinion on this issue. For some,

"at the moment it has to be a woman, because they have been training for much longer and are much better prepared (for the role)" (Valdés, *El País*)

and because

"(men) have already usurped enough of our editorial areas for (one) to take on this task (too)" (Tomé, *El Correo*).

For others, conversely,

"a man could do this job as long as he is trained for it" (Kohan, *Público*),

since

"what is needed is to have a gender perspective. If you don't question certain things, you are not going to have a gender perspective, even if you are a woman" (Requena, *eldiario.es*).

Kohan even states:

"I wish there were many more men who could have a voice in this. From the perspectives of both feminism and journalism, we should ask ourselves where the men are in this debate."

But what does the work of a gender specialist consist of? What are her specific functions?

Her principal day to day tasks

They are as follows:

a) Answering queries from colleagues. In the case of *El País* and *eldiario.es*, the queries come, above all, from their different regional newsrooms

"especially from the largest ones, those that handle a greater volume of news" (Requena, *eldiario.es*),

because in addition,

"cases of gender violence are covered in each regional edition, and the treatment of these issues always raises questions" (Valdés, *El País*).

In *El Correo*, Tomé says she is especially vigilant with the Sports section, although it not necessarily the section where most queries are raised, as,

"from the point of view of the subjects covered, it is excessively masculinized" and the "People" section, "where it is easier to perpetuate certain stereotypes."

Regarding the type of questions most frequently asked, all the participants point to those referring to the treatment of cases of male violence. Kohan and Requena cite those related to language[5], and Requena adds prostitution and trans legislation.

b) To verify that there is parity in the sources used in different pieces. The interviewees agree that it is important to guarantee the presence of female voices, not only in informative texts, but also in opinion pieces.

c) To propose topics for the different sections that have traditionally been ignored because they affect or are of special interest to women.

d) To ensure that the treatment of topics is appropriate, and that the gender perspective is taken into account.

e) To write their own pieces.

To this list of tasks, Requena and Valdés add those of meeting with management or attending editorial meetings

"to make contributions, to warn of issues to which we should be attentive or to make reflections after a specific publication" (Requena), and to write a weekly newsletter.

Assessment

Less than five years after its implementation in some Spanish media, the heads of the gender portfolios consulted make a positive assessment of their work because "although slowly, in recent years progress has been made in many things" (Kohan, *Público*) and that "good journalism with a gender perspective" is being done (Requena, *eldiario.es*; Valdés, *El País*). Specifically, Tomé (*El Correo*) notes:

"There have been changes at an editorial level and at the level of mentality. We are more attentive, more vigilant and we have made women more visible in certain sections. In some ways, an educational task has been completed."

Despite these advances, they are also aware that their position will be necessary in newsrooms for many years to come.

"If only it would stop being needed soon, but I'm afraid we have only just begun. We are still learning" (Tomé, *El Correo*).

6. Discussion and conclusions

This study´s novelty lies in mapping, for the first time, the initiatives adopted by the Spanish press for the incorporation of the gender perspective into their newsrooms. In this way, it complements other research on the working conditions of female journalists, which also indirectly influence this process of incorporation.

One of the main innovations detected in the Spanish media is the active adoption of the gender perspective (**Carvajal** *et al.*, 2022). Consequently, the map drawn up by this study shows a considerable, though disparate, presence of initiatives in place for the implementation of this perspective in the 21 newspapers analyzed. These initiatives, as **Mateos-de-Cabo**; **Gimeno-Nogués**; **Martínez-Martínez** (2007) and **Iranzo-Cabrera**, 2020, have already pointed out, have their origin in a self-regulatory attitude on the part of the newspapers.

The analysis of how these regulatory mechanisms operate has revealed that most of the style guides –10 of the 21 newspapers examined have one– are outdated, in disuse or in the process of being updated. Except for *El Mundo*, the nine to which we have had access feature gender perspective-related details, although they do not use this term explicitly, and in many cases are out of step with current realities. They contain directives, though not equally, referring to the use of sexist language, gender, gender-related terms, the treatment of sexist violence, attention to equality and the authorship of the pieces (Q1). In general, and as expected, the oldest style guides are the ones that are seen to contain fewer up-to-date directives, as opposed to the most recent one, which is being used by *El País*, and which was republished in 2021.

On the other hand, some newspapers have created specific guides to provide guidance on the treatment of gender issues in their content, as well as specific sections on women's issues (Q2). In those publications that do not have a style guide or other measures, there is –at least verbally– a perceived sensitivity to the gender perspective.

This study has also confirmed that four of the 21 newspapers studied have a gender portfolio headed by a journalist –whose job title varies– who is responsible for implementing the gender perspective in the newsrooms (Q3). From the interviews with these professionals, it can be seen that their main role is to ensure that the gender perspective is cross sectional through the newsrooms, and that it reaches all sections, genres and contents. (Q4).

Although some authors (such as **Pérez-Soler**; **Roca-Sales**, 2019; **Oliveira**, 2020) point to possible opportunistic or commercial motivations behind the creation of this role, the interviewees see genuine interest in their publications towards making gender issues visible. The assessments they make of their still brief careers are positive, and they conclude that journalism has advanced considerably in gender issues and has even done important educational work in society –as **Williams** (2000) and **Gallego-Ayala** (2015) also state. However, this positivity contrasts with the study by **Iranzo-Cabrera**, **Figueras-Maz** and **Mauri-Ríos** (2022), according to which,

"the daily work of gender editors is hindered by a lack of support from management and an absence of independence in editorial decisions."

In short, it seems that this figure will continue to be necessary until, as **Padovani** *et al.* (2022) argue, the media fully embrace gender equality as one of the basic principles of their operation.

In future research, it would be interesting to understand the trajectory of the gender editors –to discover if all newspapers will eventually have one and if, in the longer term, they will continue to be necessary– and to observe how and to what extent the gender perspective is being introduced into the editorial offices of Spanish newspapers and other media. It would also be opportune to find

> Four of the 21 newspapers studied have a gender portfolio headed by a journalist whose main role is to ensure that the gender perspective is cross sectional through the newsrooms and that it reaches all sections, genres and contents

out whether the style guides that are currently being updated include the gender perspective more broadly and explicitly.

As for the limitations that have prevented the full completion of this investigation, the lack of response to the request for information by *Libertad Digital* and the reluctance of *La Nueva España* to share its style guide, and of *El Ideal* and *OKdiario* to provide access to documents for internal use that they claim to have, are notable.

> These professionals make a positive assessment of their still brief trajectory and agree that journalism has advanced considerably and has done important pedagogical work in society in terms of gender, although it seems that this figure will remain necessary for quite some time

7. Notes

1. Conversely, another study pointed out in 2017 that women in Nordic countries are underrepresented as subjects of news stories, and as sources of information and opinion, as well as being stereotyped (**Mannila**, 2017, p. 5)

2. Some claim that gender affects the way news is written (**Van-Zoonen**, 1998) and, consequently, a greater presence of female journalists would increase the attention paid to women's issues and even increase readership if newspapers had more female editors and women in leadership positions (**Zeisler**, 2017, p. 3). Others argue that the open-mindedness of news is independent of the presence of women in newsrooms, and that the increase in female sources simply reflects an eagerness to attract female audiences (**Steiner**, 2017) and to reduce the perception that "news is for men" (**Toff**; **Palmer**, 2019).

3. **Spinetta** (2020), and **Leiva** and **Kimber** (2022) analyze this issue in Argentina and Chile, respectively. In Spain, **Pérez-Soler** and **Roca-Sales** (2019) offer some hints about this by comparing it with the situation in the United States, and **Iranzo-Cabrera**, **Figueras-Maz** and **Mauri-Ríos** (2022) approach it from the point of view of self-regulation.

4. This study focuses on initiatives created expressly for the implementation of the gender perspective in newsrooms. In this way, it complements studies on the working conditions of women journalists, which, as has been pointed out, many authors consider having an indirect influence on the implementation of the gender perspective.

5. Kohan defends the use of inclusive language and Valdés states that though she is not in favour of the duplication of linguistic genders "because it hinders reading and writing", she also assures that "if you don't, you inevitably fall into patriarchal and androcentric language. So, you have to look for general feminine synonyms: teaching staff (*plantilla de profesores*) instead of teachers (*profesorado*), for example."

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WhatsApp and transparency: an analysis on the effects of digital platforms' opacity in political communication research agendas in Brazil

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Abstract

This article aims to discuss what we call environmental opacity, a condition of mobile instant messaging services (MIMS) that operates on the basis of end-to-end encryption systems. Utilizing *WhatsApp* as a specific example, the article presents two fundamental dilemmas around which some issues concerning transparency are mobilized when it comes to digital private communication. The first of them relates to how end-to-end encryption has simultaneously become an asset and a problem for democratic environments; on the one hand, protecting users' privacy, and on the other, allowing for the circulation of misinformation and harmful content. The second dilemma deals with how this environment of opacity impacts the ethics and transparency of scholarly research focused on *WhatsApp* and other MIMSs. The paper also reviews an extensive body of studies that discuss the political uses of *WhatsApp* in different dimensions, and argues that emerging countries with large user bases, such as Brazil and India, have experienced a series of negative effects after the adoption of *WhatsApp* by politically oriented groups. Among the main proposals, the article suggests some measures to foster platform transparency and facilitate scientific research instead of hindering it.

Keywords

Algorithmic transparency; *WhatsApp*; Environmental opacity; Political communication; Privacy; Mobile instant messaging services; Research ethics; Policies.

1. Introduction

In the last half-decade, mobile instant messaging services (MIMS) have become a matter of concern for governments, civil society, and academic researchers, due to their opacity and the difficulty of monitoring the circulation of content harmful to democracy, such as mis/disinformation and hate speech, which particularly flood the discussion groups they host (**Rossini**; **Stromer-Galley**; **De-Oliveira**, 2020; **Banaji**; **Bhat**, 2019). There is a recent but vast literature that has sought to discuss these platforms, with an emphasis on specific services, such as *WhatsApp* (**Bursztyn**; **Birnbaum**, 2019), *Telegram* (**Willaert** *et al.*, 2022; **Santos**; **Saldaña**; **Tsyganova**, 2021), and *WeChat* (**Wu**; **Wall**, 2019), among others. And although, among these three examples, Russian and Chinese private messaging services equally pose challenges for their respective contexts, it is *WhatsApp*, due to its enormous popularity, especially in non-Western countries such as Brazil and India, that has boosted public debate around issues such as the spread of fake news (**Resende** *et al*., 2019; **Sacramento**; **Paiva**, 2020), and increased distrust in democratic institutions (**Piaia**; **Alves**, 2020), political radicalization (**Evangelista**; **Bruno**, 2019), and dangerous speech (**Saha** *et al*., 2021; **Matamoros-Fernández**, 2020). In all these cases, there is a lot of discussion about strategies to limit the mass dissemination of certain contents and technical solutions to contain damage to democracy (**Resende** *et al.*, 2019), but little or nothing has been discussed about the effects of environmental opacity on platform cultures, and values shared by users of these services, nor on the practical challenges for implementing democratic controls and monitoring these media.

This article seeks to explore the intrinsic relationship between opacity and transparency and between privacy and publicity, arising from political use and academic research on mobile instant messaging services. Our main goal is to discuss the challenges posed by private messaging services, in particular *WhatsApp*, to the context of democratic transparency, and how to face them. Therefore, the article is based on three different sections.

In the first one, we will present a brief contextualization about how *WhatsApp* has become one of the main protagonists in the Brazilian political scenario (**Moura**; **Michelson**, 2017), and how other countries have also faced situations arising from the way in which dissent groups have made use of the service (**Al-Zidjaly**, 2017). Brazil, together with India, constitutes an exemplary case for analysis. The country has the second largest user-base of the service across the globe, and was perhaps the first to face a major setback due to the spread of fake news and attacks on democracy in *WhatsApp* public discussion groups. In India's parliamentary elections in 2019 (**Garimella**; **Eckles**, 2020), and, in the same year, in Indonesia's general elections (**Baulch**; **Mataromos-Fernández**; **Suwana**, 2022), a similar effect was feared, and Brazil was evoked as a negative example in several circumstances (**Murgia**; **Findlay**; **Schipani**, 2019). Therefore, in this first section of the article, we aim to discuss how and why *WhatsApp* has raised concerns in different democracies.

In the second section, we will put *WhatsApp* and other digital platforms in context, in order to deepen a debate around what the literature has tried to call algorithmic transparency (**Diakopoulos**, 2014). More specifically, we intend to discuss the content regulation and moderation policies assumed by the platform itself and the effects of its actions on the users. Since 2018, in Brazil, *WhatsApp* has incorporated a series of restrictions on the forwarding of messages (**Porter**, 2020), promoted the scale banning of several users (**Mari**, 2019), and has sought to develop institutional partnerships with state agents, such as the *Superior Electoral Court* (*TSE*, 2022). As a counterpoint, one of its main rivals, the Russian *Telegram*, has shown itself to be much more reluctant to participate in this negotiation circuit. The question that remains is: have the efforts carried out by *WhatsApp* really helped to reduce the environmental opacity bequeathed by the service?

Finally, in the third section, we intend to review some of the studies developed on the uses of *WhatsApp* in political contexts. This time, however, instead of focusing on debating how *WhatsApp* has dealt with aspects concerning the privacy of its users, we focus on understanding what challenges this opacity model poses to researchers who deal directly with private data, and often in environments hostile to scholarly research. Thus, if in the previous section we discussed platform transparency, here we discuss what we can call methodological transparency around mobile instant messaging services. In the end, we present some contributions to the theoretical and methodological debate in the fields of political science and political communication regarding the research agenda concerned with MIMS.

2. Private messaging as menace or redemption for liberal-democracies

Private messaging services are nothing new. Applications such as *ICQ*, *AIM* or *MSN Messenger* were extremely popular in the second half of the 1990s. Instant messengers, however, were gradually replaced and incorporated as a functionality of social network sites (SNS), to the point that the uses of this type of platform have shrunk deeply in some countries in the early decades of the 2000s (**Barot**; **Oren**, 2015). Mobile devices, however, have updated the offer for similar services and, fortuitously, new applications have been created in periods of widespread political upheaval in different parts of the globe.

Between 2005 and 2010, the decline in instant messaging tools was partly accompanied by the decline in popularity of some services offered by large news portals, such as *AOL*, which owned *AIM*, and held more than 50% of the private communication market at that time (**Barot**; **Oren**, 2015), and *Yahoo!*, which owned *Yahoo! Messenger*. At the same time, SNSs offered complementary

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private messaging features through the so-called direct messages (DM), still present nowadays on platforms such as *Facebook* (which hosts *Messenger*) and *Twitter*. But the growing popularity of mobile devices introduced a new kind of application whose immediate emphasis was on the quick exchange of messages between users via their respective cell phones. In parallel, the growth in the number of smartphones, the spread of broadband internet and high-speed mobile networks, and the subsequent development of new voice over IP (VoIP) protocols, made instant messaging applications powerful communication tools.

The volume of data exchanged through chat apps surpassed native short-message services (SMSs) for the first time in 2013 (**Barot**; **Oren**, 2015; **Church**; **Oliveira**, 2013), and, in Brazil, this same milestone represents an important change in habits in the population. Data from the *Brazilian Internet Steering Committee* (*https://cgi.br*) regarding online users' activities show that the use of social network sites remains between 70 and 75% among the Brazilian population, from 2011 to 2018, while the use of instant messengers grew from 70 to 92% in the same period (**Chagas**, 2022). The number of people who send instant messages over the internet, according to the survey, is the highest among all other habits, such as sending emails, using blogs, and online forums.

Between 2011 and 2014, several countries experienced mass protests. Symbolic uprisings such as the *Arab Spring*, *Occupy Wall Street*, *Los Indignados* and anti-government demonstrations in Brazil, Chile and Russia, among other examples, have drawn attention to the connection between the use of digital platforms and political participation (**Bennett**; **Segerberg**, 2012; **Klein-Bosquet**, 2012; **Mendonça** *et al*., 2019). Literature has concluded that the use of social networks as news sources, the expression of political opinions, and activism itself, including mobilization through this type of platform, are some of the factors that increase participation through digital media (**Valenzuela**, 2014).

In Brazil, the use of private messaging services has grown exponentially in recent years, in the wake of what has become known in the country as the *2013 June Journeys* (**Chagas**, 2022). Social networking sites and particularly instant messengers have been widely adopted by protesters to organize protests, exchange information about events, and even share memes, as seen in other countries (**Mendonça** *et al*., 2019).

Although there are no reports of state repression and social media regulation actions that justify any degree of mistrust, as there is in the Chinese context (**Mina**, 2019), the adoption of end-to-end encryption systems by MIMS was a crucial component in increasing adoption in this kind of application. Added to this is a no less important economic factor: the expansion of the mobile network in the country, following the privatization of phone companies in the late 1990s. Competition among phone companies in Brazil led to the popularization of prepaid subscription plans among users, who then began to offer discounts or even exemption from expenses for the use of certain services, among them *WhatsApp*. It is worth remembering that this kind of practice is contrary to the provisions of the *Marco Civil da Internet* (*Law No. 12,965/2014*), which establishes equal treatment for all services incorporated by telephone companies. The so-called "zero-rating" plans were, perhaps, the main responsible for the wide penetration of *WhatsApp* as one of the most installed apps on mobile phones across the country (**Evangelista**; **Bruno**, 2019). The result of this is that, today, a wide layer of the popular classes not only use private messaging services as a way of communicating, but, to a large extent, depend on them for work. They are small traders, local markets, delivery people, self-employed professionals and cooperatives who use *WhatsApp* daily as a work tool, and end up exposed to other uses.

According to the company's own data, Brazil has more than 120 million users in 2017, and represents a share of 8% of users worldwide (**Chagas**, 2022). The data is reasonably uncertain, but the percentage of cell phones with *WhatsApp* installed in Brazil is very high. According to *Yahoo! Finance* (2021), 91% of smartphones in the country have *WhatsApp*, which places Brazil in seventh place among the largest users. In Latin America, Argentina (93%) and Colombia (92%) appear ahead. And among the five countries with the largest installed base, three are African, with Kenya ranking first (97%). In Europe, only Turkey and Spain (both with 88%) appear in the top positions.

According to data from *Panorama Mobile Time/Opinion Box Report* (2020), *WhatsApp* is installed on more than 99% of cell phones in Brazil. If one crosses this data with the annual survey released by the *Getulio Vargas Foundation* (**Meirelles**, 2022), according to which Brazil currently has more than one smartphone per inhabitant, and a total of 234 million devices in use, the resulting user base is actually impressive. In terms of number of active users, Brazil is second only to India, which has 390 million accounts (**Iqbal**, 2022).

News consumption on *WhatsApp* is also reported by users as an increasingly relevant activity. In Brazil, more than 50% of the population claimed to use the app as a news source, in 2019 (**Newman** *et al*., 2019). A year earlier, in 2018, another survey stated that 62% of the Brazilian population believed in the news they received via *WhatsApp*, while only 8% did not (**Passos**, 2018). And yet another last survey, also from 2018, found that, among Bolsonaro voters, six out of ten individuals obtain information mainly through *WhatsApp* and share political news through groups on the app (*Datafolha*, 2018).

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The information consumption habits of the Brazilian population have significantly changed recently and digital platforms in general, and private messaging services such as *WhatsApp* in particular, play an important role in this process. **Rossini** *et al*. (2021), for example, draw attention to how *WhatsApp* has become central to how Brazilians access political information and how they engage politically. And while the authors have suggested elsewhere that *WhatsApp* users who share dysfunctional information are more subject to social correction (**Rossini**; **Stromer-Galley**; **De-Oliveira**, 2020), the concern over how *WhatsApp* has become a pervasive media capable of unbalancing not only the informative diet but the democratic environment itself has been evidenced in many different studies. And not just in Brazil.

In India, one of the most notable effects discussed in the literature is the creation of surveillance networks that facilitate and encourage lynchings based on alleged complaints received through viral messages (**Mukherjee**, 2020; **Banaji**; **Bhat**, 2019). Digital vigilantism, of course, is not exclusive to mobile instant messaging services, but the fact that these users are part of a network with high social capillarity has led Indian authorities to determine that the platform should share user metadata for lawful communication and surveillance protocols (**Arun**, 2019). The panorama reflects what **Phillips** and **Milner** (2020) argue about the deep memetic frames used by extremist groups in the hope of fostering moral panic in the population. The authors claim that such frames have always been a moralizing instrument and have often been used by conservative groups to mobilize the population to react. The difference posed by the digital media regime resides in the fact that, unlike what happened before, in which these moral surges were confined to specific regions and neighborhoods, now, say the authors, information is de-quarantined and circulates widely.

In this sense, studies such as those by **Santos** *et al*. (2019) show important circulation patterns in misinformation messages on *WhatsApp*. The authors analyze how messages that evoked an alleged electoral fraud were spread virally and gained scale in geometric progression with the combined use of *WhatsApp* as a private message service and as a broadcast communication tool, from public discussion groups that include, each, up to 256 users.

Vermeer *et al*. (2020) also recall that *WhatsApp* seems to favor the mobilization of users. And **Gil de Zúñiga**, **Ardèvol--Abreu** and **Casero-Ripollés** (2019) suggest that *WhatsApp* has a positive influence on activism and political participation among its users. **Chagas** *et al*. (2022) align with this conclusion by drawing attention to the participatory distortion effects that the platform plays through calls to action for voting in public consultations, once again, broadcasted through political discussion groups.

Although the literature is not consensual and is somehow inconclusive around the *WhatsApp* electoral impact (**Schaefer** *et al*., 2019), it seems clear that the public discussion groups provide an effect of radicalization in users, since they become part of a kind of echo chamber (**Evangelista**; **Bruno**, 2019). Radicalization is a clear result of the mix between homophilic audiences and hyper-partisan informative diets, as pointed out by studies such as those by **Mont'Alverne**, **Mitozo** and **Barbosa** (2019) and **Santos**, **Chagas** and **Marinho** (2022). But none of this would be possible without an environment of extreme opacity.

Arun (2019) argues that the same technological structure that protects users from eventual invasions of privacy also results in an environment that encourages the dissemination of harmful speeches and online rumors. End-to-end encryption would therefore be both the solution and the very source of the problem. The fact is that the lack of transparency regarding the metadata of messages circulating on *WhatsApp* is reflected in an environment of extreme surveillance and virtually no possibility of democratic moderation and regulation. The most evident symptom of this has been the growing use of *WhatsApp* for the performance of influence operations and astroturfing practices (**Chagas**, 2022), in which agents from the professional field of politics covertly act as spontaneously mobilized audiences. Thus, the platform's lack of transparency results in actions and behaviors that are not only inauthentic but misleading. In the next section, we discuss these effects a little further.

3. The dilemma of privacy and public transparency within *WhatsApp*

WhatsApp was created in 2009, months before some of its current main competitors such as *Viber* (2010-), *Line* (2011-), *WeChat* (2011-), *Telegram* (2013-), and *Signal* (2014-). In February 2014, the service was acquired for US$19 billion by *Facebook, Inc.* (currently *Meta Platforms*), in what was then the largest acquisition of a venture-capital-backed company in history. And, in November of the same year, through a partnership with the company *Open Whisper Systems* (*OWS*), *WhatsApp* announced the implementation of an end-to-end encryption system for all its clients, based on the protocol developed by another instant messenger, *Signal*.

According to the end-to-end encryption system, only the sender and the recipient have access to the messages and contents shared. The company claims that not even it has access to the messages, which would prevent *Meta* itself from moderating or censoring the content circulated, and/or tracking habits and messages for target ads, for instance. Although this is a discussion not yet completely resolved, since some studies and reports claim that the company has access to encrypted content shared by users (**Freitas**, 2019), this technological model added to the adopted discourse has allowed the company to avoid possible charges for a more proactive action in cases of circulation of disinformation and hate speech.

There are several kinds of encryption systems. The simplest models are called symmetric ciphers, when a secret key is shared between the sender and the receiver so that the encrypted message is interpreted. A more complete model is called an asymmetric cipher, where receiver and sender have a public key and a private key. In this way the text is en-

crypted in the public key between the two users, but it can only be decrypted with the private key of each one. This late model prevents third parties from accessing the whole message base, in case of interception. That is, if a third party discovers the private key, it will only have access to a single message, not the entire system (**Teixeira**; **Sabo**; **Sabo**, 2017). The encryption model adopted by *WhatsApp*, however, is a bit of a mystery.

WhatsApp shares public information about its encryption system in a general way, giving transparency only to the protocol model. However, it does not make clear how the system works in practice within the application. Making opaque, for example, the information whether or not the application stores user data. Although *Meta* claims that it does not have access to forwarded messages, there is no reliable credibility that this does not actually happen, taking into account the company's history, in cases such as *Cambridge Analytica*, where *Facebook* user data were shared with third parties for targeting political ads. In addition, a feature recently adopted by *WhatsApp* as a way to prevent and highlight content spread virally, a tag that allows one to identify frequently forwarded messages, suggests that even encrypted messages can be accessed and identified by the company.

> In short, from a corporate perspective, *WhatsApp* oscillates between transparency and privacy inconsistently. For users of their business accounts, privacy is not considered, but for individual users who disseminate messages on a large scale through groups or broadcast lists, the service reserves the right not to act, claiming the right to privacy of its user base

Another point of concern is the adoption by *WhatsApp* company, in 2021, of privacy policies subordinated to local contexts and norms (*Abraji*, 2022). The side effect of this change is that, in European Union countries, governed by the *General Data Protection Regulation* (*GDPR*), privacy rules have become excessively strict, but in countries like Brazil, for example, the new policy has made it easier to share user data with the *Facebook* application. Thus, registration information, phone number, IP address, mobile device information such as model, battery level, signal strength, messaging app version, default browser information, mobile network, and even data transactions and payments, and navigational habits (time, frequency and duration of activities, performance reports, etc.) are now interoperated. In addition, the contents of messages exchanged through *WhatsApp* business accounts are no longer encrypted and the metadata generated can be used by *Facebook* to propose ads (**Cosseti**, 2021).

In short, from a corporate perspective, *WhatsApp* oscillates between transparency and privacy inconsistently. For users of their business accounts, privacy is not considered, but for individual users who disseminate messages on a large scale through groups or broadcast lists, the service reserves the right not to act, claiming the right to privacy of its user base.

This inconsistency has been sustained on different occasions by the rhetoric adopted by the *WhatsApp* office in Brazil in public speeches in which it is emphasized that approximately 90% of the messages exchanged through the application are limited to interpersonal communications between two users, and that the average number of users in groups hosted by the service averages around seven individuals (D. Durigan, personal communication, October 27th 2020). And, although these data are replicated in studies that, having received funding from *WhatsApp*'s own public calls, argue that research on the political effects of dysfunctional information sharing should not emphasize large groups dedicated to political discussion, since they would be the exception and not a rule, and would not reflect the experience of most users (**Rossini** *et al*., 2021), it is notable that the problem is not related to the interpersonal exchanges but to the virality of messages shared by and within these groups (**Santos** *et al*., 2019). Thus, ignoring the threat posed by end-to-end encryption applied to public groups with the participation of agents from the professional field of politics (**Chagas**, 2022; **Chagas**; **Modesto**; **Magalhães**, 2019), is equivalent to color-blind the nuances acquired by the service by incorporating multiple affordances. Furthermore, as studies such as those by **Santos**, **Chagas** and **Marinho** (2022) and others have tried to demonstrate, *WhatsApp* works mainly as a kind of information hub, integrating different platforms and social groups. In this way, even though the large political discussion groups are absolutely minority, they act in the sense of dynamizing and spreading content to smaller groups and individual users, in a very significant way.

WhatsApp can no longer be seen as just a one-to-one instant messenger, in a private context, but as a very complete broadcasting tool. **Vieira** *et al*. (2020) claim that with the expansion of the application, and especially with the massive use of resources such as forwarding messages to multiple users and groups, the messenger stopped being a merely technological platform and became a media platform.

> "As a media platform, just like a radio or television channel, it spreads content through its information broadcast functions and allows messages to become viral" (**Vieira** *et al*., 2020, p. 4).

One of the pernicious effects of this policy adopted by *WhatsApp* for its discussion groups is the opacity regarding operations such as the mass-messaging, spamming, and the spread of fake news and hate speech (**Resende** *et al*., 2019). As argued below, this opacity is even greater due to the fact that the platform does not have an API and has not sought to facilitate scholarly monitoring and research initiatives.

In response to serious criticism after the 2018 presidential elections in Brazil, *WhatsApp* claims that it has regularly and automatically banned or blocked a series of accounts that violate the platform's rules or current electoral legislation. In

parallel, the app has sought to develop partnerships with fact-checking organizations such as *AFP Checamos*, *Agência Lupa*, *Aos Fatos*, and *Estadão Verifica*. In India, similar initiatives involve partnerships with *Digit Eye*, *Fact Crescend*, *Factly*, *India Today*, *Newschecker*, *Newsmobile*, *The Healthy Indian Project*, *The Quint - WebQoof*, and *Vishvas News*. There are also fact-checkers that offer the same kind of service in Albania, Argentina, Colombia, Croatia, Ecuador, France, Germany, Georgia, Ghana, Greece, Guinea, Indonesia, Ireland, Italy, Ivory Coast, Kenya, Mexico, Nigeria, Peru, Portugal, Senegal, Spain, South Africa, Sri Lanka, Turkey, United Kingdom and United States (*WhatsApp*, 2022).

Partnerships have also been carried out with public institutions. In Brazil, the *WhatsApp* office signed a memorandum of agreement with the *Superior Electoral Court* (*TSE*) in which it commits to implement or assist in the implementation of initiatives to combat misinformation about the electoral process. Among the planned actions, *WhatsApp* proposed to:

- hold seminars for *TSE* and *Regional Electoral Courts* (*TRE*s) on the application;
- produce booklets about the service; and
- assist in the implementation of actions for the rapid identification and containment of misinformation, such as the creation of an extrajudicial channel for reporting content that violates legislation and the development, in partnership with the *TSE*, of a chatbot with information about elections from reliable sources (*TSE*, 2022).

However, from a technical point of view, the measures taken by *WhatsApp* so far to contain these effects have focused on limiting forwarding messages and blocking/banning users who disseminate infringing content. Little or nothing has been done to make the environment more transparent, quite the opposite. Among the most recently incorporated affordances, *WhatsApp* allowed:

- blocking messages from unknown numbers and reporting them as spam;
- setting which users can add a given account to new groups.

In addition, since 2018, *WhatsApp* has limited the forwarding of the same message to only 20 contacts (including groups) at a time in Brazil, and, in 2019, it again reduced this limit to five contacts. In 2020, the service started to identify high-frequency messages (HFM) with a specific label, and then limited HFM forwarding from five to just one contact at a time. These limits reportedly reduced message sharing in Brazil by 30%, and reduced high-frequency message traffic worldwide by 70% (*WhatsApp*, 2021). However, there is still little transparency regarding the measures taken after a message has been reported as spam, and there is not, so far, much clarity also about accounts banned from the platform for misbehavior. According to the company's own international reports, an average of 8 million accounts are banned from the platform monthly and about 95% of the deletions are made by automatic detection (**Bento**, 2022).

These measures proved to be ineffective mainly in a context where the dissemination of misinformation has taken on a wide scale and has been ideologically oriented, such as in Brazil. Public political discussion groups are mostly managed by Brazilian far-right supporters (**Chagas**, 2022), and, although sustained by users who show a high degree of engagement, they are also marked by an expectation of horizontality, in which moderation allows for the free sharing of messages, as long as it meets the ideological prerogative of the group itself, that is, only content that is politically in disagreement with the group's guidelines is summarily eliminated.

WhatsApp does not have the same structural features as other social network sites. For example, it does not have public profiles, it does not publicly display connections between users, and it does not have affordances recently incorporated by different digital platforms, such as the timeline that organizes the posts displayed through a social algorithm, according to personal and navigation preferences for each user. According to **Sahafizadeh** and **Ladani** (2020) the use of instant mobile messengers, such as *WhatsApp*, has constituted a new model for online communication. Unlike traditional social networks, based on friendship relations, MIMS users face two different modes of communication:

- peer-to-peer, they usually need to have the contact of their interlocutor registered in their devices;
- in discussion groups, the platform works as a broadcast environment, in which it is not necessary to know the people with whom they interact.

Much of the discussion focused on the danger that social media poses to contemporary democracies emphasizes the opacity surrounding these social algorithms and content recommendation systems. For instance, there are studies that discuss how *YouTube* recommends videos to its users based on non-transparent criteria, which results in recommendations for hyper-partisan or harmful content (**Bryant**, 2020). *Twitter* has already admitted that far-right content has been favored and gained wide exposure through its platform (**Huszár** *et al*., 2021). And *Meta* and *Facebook* have similarly been subjected to public scrutiny on different occasions, including the repercussions of the *Cambridge Analytica* scandal. **Benkler**, **Faris** and **Roberts** (2018) also sought to demonstrate that the affordances of digital platforms have been used to pri-

> "Unlike traditional social networks, based on friendship relations, MIMS users face two different modes of communication. In the first, peer-to-peer, they usually need to have the contact of their interlocutor registered in their devices. But, in discussion groups, the platform works as a broadcast environment, in which it is not necessary to know the people with whom they interact"

vilege the exposure of content by politically interested groups, and **Woolley** and **Howard** (2018) draw attention to how computational resources, including bots and sock-puppet networks, have been used to spread political propaganda in digital media.

Literature, however, rarely focuses on *WhatsApp*. Not only because of the difficulty of monitoring the platform that it poses for researchers, as we discuss below, but also because its architecture is fundamentally different from that of social media, and, because of that, the same criteria that apply to the demand for greater algorithmic transparency as advocated by various scholars, do not apply to *WhatsApp*'s opacity environment.

In the case of *WhatsApp*, the main problem is not the opacity of its algorithms, but the opacity in the metadata of its contents and users. Briefly, it is impossible to determine how many political discussion groups there are on the platform, or how a particular message circulated, if it is overperforming in engagement, or even if it was viewed above average. It is not possible to identify which links have circulated the most and from which information sources (**Santos**; **Chagas**; **Marinho**, 2022; **Mont'Alverne**; **Mitozo**; **Barbosa**, 2019), nor which memes or anti-science content have been passed on among users and which users are the ones who share such content (**Massuchin** *et al*., 2021). As a result, unlike what happens in other social media, in *WhatsApp*, the main problem is not the influence of opaque systems for recommending content to users, but the complete absence of parameters capable of guiding users about the content that reaches them through direct recommendation from other users, which we are calling here environmental opacity.

We do not know with absolute transparency how the end-to-end encryption adopted by the service operates, and whether or not *WhatsApp* stores messages on its own server. We don't know which accounts are banned and for what reasons. And we don't even have mechanisms to track harmful messages or reports on the decisions made by the platform.

It is not just about charging algorithmic accountability from *WhatsApp*, as is done with other platforms, therefore (**Diakopoulos**, 2014). The prevention of misinformation and dangerous content on *WhatsApp* should not be limited to technical restrictions or blocking and banning accounts based on automated identification of inauthentic behavior, but above all on the need to provide more transparency to the metadata of content and users on the platform. This type of solution does not violate user privacy principles, as it is not necessary to identify users a priori. But it is perfectly possible from a technical point of view to present, for instance, how many times a given message was forwarded, how many users viewed it, at what date and time it was created, and even what were the global reactions to the message. These elements alone may be insufficient to discern whether it is harmful content or not, but they can certainly help in the decision of who accesses a particular piece. These are precisely the same metrics that we have when we access a *YouTube* video or read a *Facebook* post. But they are not available on *WhatsApp* or other private communication services, even though, as we have seen, such platforms merge private messaging with broadcast mode.

The treatment of these two modes of communication based on the same principles, with the prevalence of privacy over public transparency in the case of discussion groups and broadcast lists, has resulted in a first dilemma concerning transparency on *WhatsApp*, according to which the same characteristics that give the platform a high degree of protection for users' privacy contribute to undermining the democratic environment due to an absolute lack of public transparency. Add to this the enormous difficulty of researchers in penetrating these environments, as we discuss further, and we have the formula for a time bomb to discredit democratic institutions.

From a legal standpoint, one of the pioneering laws to bring *WhatsApp* and traditional social network sites on a par, and punish the ones who create or distribute fake news, requiring a quarterly report on each platform's policies and moderation decisions, is the United Arab Emirates *Cybercrime Law* (**Kabha** *et al*., 2019). According to the authors, although it receives criticism for being too rigorous, the legislation has prevented harmful uses of *WhatsApp* and other social media.

In Brazil, two cases are currently under discussion in the *Supreme Court*, the *Direct Action of Unconstitutionality No. 5.527*, and the *Claim of Non-Compliance with a Fundamental Precept No. 403*. In both cases, the judicial decisions of lower courts to determine the national suspension of message exchange services are questioned. The docket reports of both actions, however, present distinct perspectives. In the first case, Justice Edson Fachin opposes to the suspension of apps by court orders. In the second, Justice Rosa Weber understood that end-to-end encryption cannot prevent

access to judicial means. Recently also, the *Brazilian Senate* approved the Bill No. 2.630, called the "Fake News Bill", which provided rules for social networks and applications such as *WhatsApp*, to fight disinformation. The project still needs to be approved by the House to be sanctioned.

In the Brazilian Executive, the new government of Luiz Inácio Lula da Silva apparently has been moving quickly to contain the circulation of messages of hate and incitement to crimes in the online environment. The now Brazilian Minister of Justice and Public Safety, Flávio Dino, delivered a "Democracy Package" to the *Parliament*. The measures involve

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classifying the organization and incitement to anti-democratic demonstrations as a crime of terrorism, such as those that took place in Brazil on January 8 2023, when supporters of former President Jair Messias Bolsonaro invaded and vandalized the headquarters of the three powers of the Republic, in a clear attempt at a coup d'état. The news has drawn attention to the role of MIMS such as *WhatsApp* and *Telegram* in mobilizing for the acts (*Poder360*, 2023).

On the discussion of regulation, **Medeiros** and **Singh** (2020) argue that lawmakers cannot ignore the negative consequences of encouraging overzealous moderation practices. For forcing changes in platform architecture,

> The means to resolve these dilemmas are in the hands of legislators and digital platforms. These agents can ensure that scientific research has minimal conditions to function, and thus provide society with more data and inputs about polarized environments, as is the case with extremist political discussion groups on *WhatsApp*

specifically the removal of end-to-end encryption, and proactively enforcing content removal responsibilities can be problematic and compromise dissenting discourse. On the other hand, the platforms themselves have relied on this defense to deny the existence of the problem. The point, however, is that conversations between users cannot be confused with permissiveness for anti-democratic mayhems. And this distinction is at the root of the difference between peer-to-peer and broadcast communication in these applications, something that legislation rarely pays attention to.

4. The dilemma of methodological transparency within *WhatsApp*

There are fundamentally two types of difficulties faced by researchers who focus on investigations on *WhatsApp*, which can also be described as methodological transparency issues:

- the first one is the challenge posed to deal with the almost complete lack of transparency on the part of the platform with regard to its data, and
- the second and no less important is the challenge posed by the need to respect the private nature of the data related to the individuals observed.

Regarding the first difficulty, according to **Benevenuto** and **Ortellado** (2020), researchers would benefit if *WhatsApp* regularly publishes two types of information:

- aggregated surveys on platform users, such as the number of users, groups and number of messages distributed in groups, or information about viral messages, such as the number of times a certain content was shared; and
- information and protocols for data collection by academic researchers, i.e. an API documentation.

In recent years, *Twitter* (**Tornes**, 2021), *YouTube* (*YouTube*, 2022) and *TikTok* (**Roth**, 2022) have developed programs aimed at researchers, including specific APIs for the academic audience. Other *Meta* platforms, such as *Facebook* and *Instagram*, have APIs for developers and agreements with some scholarly institutions for the cession of data for academic investigations (**Li** *et al*., 2022).

WhatsApp Business has an API for developers, but the ordinary version of the app, aimed at individual use, lacks greater transparency regarding the procedures for scraping data. Thus, most of the research developed around *WhatsApp* has been anchored either in qualitative analysis strategies, such as ethnography (**Cesarino**, 2020), or in unauthorized data scraping methods (**Piaia**; **Alves**, 2020), which can come up against in the platform's own automated filters aimed at identifying and banishing inauthentic behavior. What often happens is that, as the process involves automation mechanisms, for the data to be collected, the application itself interprets that the action performed is suspicious and inactivates the account that was being used for research, considering that the behavior violates the norms.

An alternative for large-scale data collecting from *WhatsApp* is the app's native chat export tool or the scraping of browsing sessions via the *WhatsApp* Web app. In both cases, researchers face challenges in handling and wrangling the data, as available metadata is scarce –often only the author and content of the message and the date of its publication are available (**Gruber**, 2022).

At the same time, as researchers do not have data on the service's user base and groups, the samples they deal with in their respective investigations are invariably non-probabilistic samples, which makes it difficult to draw inferential conclusions. To circumvent this situation, some researchers have chosen to carry out surveys with individuals who self-identify as *WhatsApp* users, instead of dealing with the data published through the platform and the users associated with it (**Gil de Zúñiga**; **Ardèvol-Abreu**; **Casero-Ripollés**, 2019; **Rossini**; **Stromer-Galley**; **De-Oliveira**, 2020). Something similar happens with viral content. Since the data obtained are not representative in scale of what circulates on *WhatsApp* in general, it is not possible to certify whether a content replicated N-times in a certain set of observed groups actually achieved a significant reach among the entire user base of the service.

Therefore, the first problem related to research on *WhatsApp* and transparency lies in the fact that the platform's environmental opacity compromises the data extraction and collection. On the other hand, the second issue is related, as we stated earlier, to the observed individuals.

This second challenge refers to the private nature of the data that circulates through *WhatsApp*. Unlike what happens on other social media platforms, *WhatsApp* users do not sign a consent form for the publicity of their content. On the contrary, *WhatsApp* bases its experience on a private messaging service. Thus, researchers need to deal with a potential violation of users' privacy when investigating theses environments. Research on *WhatsApp* data, as a rule, has two different expedients in order to avoid compromising privacy rules:

- the first of these is the anonymization of data, which includes the complete de-identification of users, and
- the second is the presentation of results only on an aggregated data scale, thus avoiding individualized analyses.

In the European Union, the *General Data Protection Regulation* (*GDPR*) establishes strict rules regarding the privacy and data protection of citizens residing in member countries. By 2020, Brazil has adopted similar legislation in this regard, called the *General Data Protection Law* (*LGPD, Law No. 13,709/2018*), which is a set of regulations for the *Federal Public Administration*, companies and institutions regarding the handling of personal information. The Brazilian *LGPD* establishes as personal data

> "[all] information related to an identified or identifiable natural person,"

and therefore considers sensitive, among others, data related to racial or ethnic identity, gender, religious conviction, political opinion, union affiliation or civil organization, and those relating to health or sex life, genetic or biometric traits of any individual (**Wirnerm**, 2019).

Due to this legal treatment, and also for ethical reasons, research in encrypted private chat apps has sought to ensure full anonymization for research subjects. However, the difficulties do not stop there. Most research ethics councils usually consider the application of an informed consent form to subjects as a good practice. The *WhatsApp* discussion group environment, however, is absolutely volatile, with users coming and going all the time, and discussion groups that are created and suddenly dissolved. Thus, **Barbosa** and **Milan** (2019, p. 59) draw attention to how much this type of platform requires an innovative ethical and methodological approach, in which

> "avoid reducing research ethics to a one-stop checklist [...]; moving past the consent form as the sole and merely regulatory moment of the researcher-research subject relationship."

The authors, however, advocate a research agenda, which

> "embraces transparency and when the research question allows covert methods, avoid dishonest bypasses."

This mention is in line with what **Chagas**, **Modesto** and **Magalhães** (2019) discuss about covert research protocols. In Brazil, covert research is authorized by *Resolution No. 510, of April 7, 2016*, of the *National Health Council* (*CNS*), a collegiate body of the *Ministry of Health* that has an intersectoral commission responsible for implementing norms and guidelines for research involving human beings, the *National Research Ethics Commission* (*Conep*). All research with human subjects, from any area, must be appreciated and evaluated by this body prior to its development. *Resolution No. 510* establishes that covert research is the one

> "conducted without the participants being informed about the objectives and procedures of the study, and without their consent being obtained before or during the research,"

and it is justified only

> "in circumstances in which the information about goals and procedures would change the target behavior of the study or when the use of this method is presented as the only way to conduct the study."

It is a methodological approach reserved for liminal situations, in which individuals cannot even recognize themselves as observed subjects, since this would alter their usual behavior. It is a different procedure, therefore, from that of clinical studies in which substances such as placebo are administered to patients, since, in these cases, consent for the administration of the drug or vaccine is required, even if it is applied only in one portion of the research subjects.

Barbosa and **Milan** (2019) recommend avoiding this type of strategy as much as possible, as well as **Padilha** *et al*. (2005), who argue that this research approach suppresses the right of subjects not to be researched, but they assent that there are scenarios in which data collection in other ways is simply unfeasible. **Chagas**, **Modesto** and **Magalhães** (2019) claim that, especially, research agendas developed in far-right private communication groups require a little more flexibility with precepts of research with human beings. They highlight that in cases like those covert research is often necessary. This is because, in extremist groups, it is common for the simple presentation of the researcher to lead to an immediate expulsion. It is a hostile field for academic research, and absolute methodological transparency is not always able

> ❝ The first dilemma concerns the relationship that such services have sought to establish between the privacy of their users and public transparency, piggybacking on the rhetoric of privacy protection to deny an environment of transparency regarding metadata of potentially harmful content and inauthentic behavior. The second dilemma concerns an effect of the first, weakening scholars due to the private nature of the data available for research ❞

to resolve the effects of political radicalization. This finding leads to a second important dilemma concerning transparency in *WhatsApp*, according to which more methodological transparency is not always able to generate consent from the research subjects, and environments resistant to science may eventually demand exceptional treatment in this regard.

5. Last remarks

This article aimed to discuss issues involving mobile instant messaging services (MIMS), in particular *WhatsApp*, and transparency. We based our observations on two levels, which we called dilemmas:

The first dilemma concerns the relationship that such services have sought to establish between the privacy of their users and public transparency, piggybacking on the rhetoric of privacy protection to deny an environment of transparency regarding metadata of potentially harmful content and inauthentic behavior.

The second dilemma concerns an effect of the first, weakening scholars due to the private nature of the data available for research. In the latter case, although methodological transparency is a highly desirable requirement, there are situations in which research demands covert methodological approaches, in order to ensure that certain arenas are not completely impenetrable.

These two dilemmas have represented important difficulties for the development of academic research on *WhatsApp* in recent years. Even so, the advances are remarkable, as most of the bibliographic references mobilized throughout this text are able to show.

It should be noted that research ethics, especially in the digital humanities, cannot be reduced to completely inflexible instruments that do not respect specific contexts and situations. On the other hand, it is not our intention to prescribe a playbook without norms, in which the game played equates researchers with anti-science radicals. Instead, what we suggest is that the means to resolve these dilemmas are in the hands of legislators and digital platforms. These agents can ensure that scientific research has minimal conditions to function, and thus provide society with more data and inputs about polarized environments, as is the case with extremist political discussion groups on *WhatsApp*.

Within this context, this article claims that it is absolutely urgent that States develop regulatory models to cope with the spread of disinformation and hate speech in digital platforms. While the major concern of companies has been a compromised and controversial reading of the principle of freedom of expression, little or no transparency about their own actions and business models has been provided to public authorities. MIMS platforms should be called to transparently explain how their encryption system works to users; regularly report to authorities and civil society basic information about banned accounts and the motivations for such decisions; also regularly report the metadata of public groups and frequently forwarded messages; provide users with metadata on the circulation of the viral messages, their senders, and their engagement metrics; and, finally, provide an API for researchers with clear and transparent metadata available.

Other more heterodox actions can also be prompted, but should equally provide guarantees for freedom of expression and protection of personal data. Among them may occur: the enforcement of moderation policies; individual and group sanctions such as alerts, content removal, and user deplatforming. In all cases, however, it is important to bear in mind that it is not a matter of adopting autocratic methods to prevent anti-democratic manifestations. The most important thing, in all scenarios, is to encourage platforms to dialogue with public authorities, civil society, and researchers. Instead of surrounding themselves with an opaque model, perhaps adopting more transparency, it leads to a win-win conclusion.

> "Los medios para resolver estos dilemas están en manos de los legisladores y las plataformas digitales. Estos agentes pueden garantizar que la investigación científica tenga unas condiciones mínimas para funcionar, y así proporcionar a la sociedad más datos y aportaciones sobre entornos polarizados, como es el caso de los grupos de discusión política extremista en *WhatsApp*"

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Formula for the success of humor journalism formats on television according to their professional teams

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Abstract

Success on television can be measured according to a series of variables. In this work, a theoretical review was carried out to determine its main factors, complemented with 34 in-depth interviews with the heads of the seven longest-running journalistic humor formats on Spanish television from 1990 to 2015. Owing to their importance in terms of broadcasting and support from society, these enable an evaluation of entertainment as it is linked to information, as both a societal need and technique for escapism, thus depicting the enhanced importance of the television medium in terms of how its content, characters, and structure form part of our collective history. The conclusions have a social character in revealing what the public has consumed, and an economic character, as they decipher what works on television, using a method based on five factors: content, technical execution, awards and reviews, audience, and context. The interviewees provide the keys to the success of the audiovisual cultural industry, characterized herein using 100 categories. For television professionals, success is a utopia that is achieved only by those who combine high-quality content and excellent technical execution, for which they receive awards and strong reviews that reinforce their image with the audience, whose numbers and opinion determine, together with the context, competition, and market conditions, their time on air. Their statements reveal that differentiation, talent, the backing of the network, and creative freedom based on tenacity are fundamental features. Achieving success is a complex task, with a proven formula that does not only represent a limitation but also enables innovative contributions from other genres.

Keywords

1. Introduction

Success is the purpose with which every audiovisual product is born. However, it is a difficult and unrealistic aim, with success being limited to those products that have their own style and receive good reviews as well as awards. It is generally accepted that these external responses are linked to quality as an evaluation factor and to its major results: to capture a large audience in a lasting fashion in comparison with its competitors. To achieve this, television repeats successful models with the purpose of connecting with the viewer by adopting an attractive tone that can excite the audience (**Gascón-Vera**, 2019, p. 157) by different means involving the key factors defined herein, since success is a multidimensional variable.

Television content can be categorized into fiction, information, and entertainment (**Montero-Díaz**, 2014). However, the wide diversity of channels and media also results in new developments through hybridization (**Gordillo**, 2009) for viewers who determine the survival of such new developments that, in turn, form part of a profit-based business strategy (**Gómez-Rodríguez**, 2017).

In television, failure is severely punished, according to **Contreras** and **Palacio** (2003, p. 197), as it is an industry that creates an "excessive halo" for success and that reaches "extreme limits" with failure, given that three out of four program launches per season fail to gain the confidence of their channels (**García-Matilla**; **Arnanz**, 2011, p. 99). Nevertheless, television history includes successes that have remained on air for decades and even half a century, such as *Informe semanal* (*TVE*, 1973 to the present), the longest-running Spanish television show, or the 47 seasons of *Saturday Night Live* (*NBC*, 1975 to the present).

Television maintains a relevant position in everyday life (**Vázquez-Barrio**; **Torrecillas-Lacave**; **Suárez-Álvarez**, 2021), thanks to the interest that its content awakens in an audience that is declining but still includes 26.5 million Spaniards who watch this powerful device for a total of almost three hours per day (*Barlovento Comunicación*, 2022).

Television mass media broke its own records during the Covid-19 pandemic, exhibiting a quantum leap (**Montaña-Blasco**; **Ollé-Castellà**; **Lavilla-Raso**, 2020) driven by an exceptional scenario of informative needs and a social demand for entertainment as a remedy to address adversity (**Mayo-Torres** *et al.*, 2020). Audiences increased and content was adapted (**Túñez-López**; **Vaz-Álvarez**; **Fieiras-Ceide**, 2020), not only in Spain (**Gascón-Vera**, 2021; **Andueza-López**; **Santana-Mahmut**; **De-Luis-Otero**, 2021) but also worldwide, with television humor being launched to serve the public.

Social, technological, political, economic, or any kind of context and conditioning factor may affect the emergence, transformation, empowerment, transfer, or disappearance of a given genre (**Marta-Lazo,** 2012, p. 33). Thus, results have emphasized the importance of humor through an approach to understand its history (**Montero-Díaz**; **Paz-Rebollo**, 2013) and discover what society has laughed about, providing key results that can revive programs that are on the verge of disappearing or creating new ones using formulas that, as demonstrated decades ago, are akin to success.

> " Social changes can be understood through the evolution of television formats, and the greatest doubt of creators is thus solved: what will work on television "

2. Measuring formulas for television success

Some research exhibits the difficulty of elaborating common criteria (**Ferrer-Ceresola**, 2018) to rate quality (**Medina**, 2006). However, the measurable components of content, scenography, artistic and professional cast, technical quality, or the commercial component are reported in the contributions by **Zabaleta-Urkiola** (2005), **Blanco-Mallada** (2005) and his four perspectives, the decalogue of **Sánchez-Tabernero** (2000), and the five elements for judging the quality of television programs proposed by **Ojer-Goñi** (2008).

Therefore, quality is the first requirement for success (**Bardají**; **Gómez-Amigo**, 2004, p. 144) in an industry where time is money, since success must be achieved from the very first broadcast. Its effective measurement thus becomes vital. Although it has been pointed out (**Guerrero**, 2013) that the list of factors for success is not finished, that there is no magic formula (**Saló**, 2003), nor is it an exact science (**Silva**, 2010), nor is it universal, one can identify a pattern that combines quality and success on television. This can start from the common components proposed by **Thompson** (1996), **Verhoeven** *et al.* (2018), and **Martínez-Gallego**; **Gómez-Mompart**; **Bordería-Ortiz** (2010) or the contributions of television organizations such as the *Gabinete de Estudios de la Comunicación Audiovisual* (*GECA*, 1995), the studies of *Prix Italia* (1985), and *The Broadcasting Research Unit* (1989), the five ingredients presented by *The Wit* observatory, or the 99 described by the television critic **Terán** (2019).

These form the constituent elements of programs that use them as assets in the search for success by orienting their structure or content (**Videla-Rodríguez**; **Sanjuán-Pérez**, 2006), as presented in Table 1.

Table 1. Theoretical-practical indicators linked to television success

Content **Albers** (1992); **Saló** (2003); **Zabaleta** (2005); **Medina-Laverón** (2006); **Ojer** (2008); **Guerrero**; **Etayo** (2015); **Verhoeven** *et al.* (2018).	Simple idea. Identity as a differential value: exclusivity	*GECA* (1995); **Sánchez-Tabernero** (2000); **Saló** (2003); **Bardají**; **Gómez** (2004); **Catela** (2005); **Pujadas** (2011); *The Wit* (2016).
	Run time and on-air durability	*The Broadcasting Research Unit* (1989); **Thompson** (1996); **Sánchez-Tabernero** (2000); **Saló** (2003); **Bardají**; **Gómez-Amigo** (2004); **Medina-Laverón** (2006); **Gordillo** (2009); **Bonaut-Iriarte** (2010); **Terán** (2019).
	Social, political, and cultural current affairs. Its own, controversial, emotional, and self-referential subject matter. Realism	**Blumler** (1991); **Thompson** (1996); **Eastman**; **Ferguson** (1997); **Sánchez-Tabernero** (2000); **Medina-Laverón** (2006); **Lu**; **Lo** (2007); **Ojer-Goñi** (2008); **Ferrer-Ceresola** (2018); **Verhoeven** *et al*. (2018).
	Journalistic ethics and credibility	**Pujadas** (2001); **Terribas** (2002); **Camacho-Ordóñez** (2005).
	Funny and informative script, thanks to humorous contributions	**Martínez-Abadía** (1993); *GECA* (1995); **Lasagni**; **Richeri** (1995); **Thompson** (1996); **Videla-Rodríguez**; **Sanjuán-Pérez** (2006); **Tur-Viñes** (2006); **Lu**; **Lo** (2007); **Bonaut-Iriarte**; **Grandío-Pérez** (2009); **Martínez-Gallego**; **Gómez-Mompart**; **Bordería-Ortiz** (2010); **Silva** (2010); **Ferrer-Ceresola** (2018).
	A diversity of approaches and plurality of content. Innovativeness, variety, and renewal	*The Broadcasting Research Unit* (1989); **Albers** (1992); **Sánchez-Tabernero** (2000); **Gutiérrez-Gea** (2000); **Terribas** (2002); **Bardají**; **Gómez-Amigo** (2004); **Zabaleta-Urkiola** (2005); **Blanco-Mallada** (2005); **Medina-Laverón** (2006); **Pujadas**; **Oliva** (2007); **Pujadas** (2011); **Ferrer-Ceresola** (2018); **Verhoeven** *et al*. (2018); **Terán** (2019).
	Emulation of content	**Eastman**; **Ferguson** (1997).
	Commitment from the channel	**Martínez-Abadía** (1993); **Catela** (2005); **Martínez-Gallego**; **Gómez-Mompart**; **Bordería-Ortiz** (2010).
	Upstream and downstream programming, counterprogramming	*GECA* (1995); **Eastman**; **Ferguson** (1997); **Cortés** (2001); **Pujadas**; **Oliva** (2007); **Silva** (2010); **García-Matilla**; **Arnanz** (2011); **Pujadas** (2011); **Terán** (2019).
	Editorial and creative freedom	*The Broadcasting Research Unit* (1989); **Pujadas** (2001); **Catela** (2005); **Bonaut-Iriarte** (2010).
	Professionalism, talent, experience, creative and artistic work	**Martínez-Abadía** (1993); **Leggatt** (1996); **Thompson** (1996); **Eastman**; **Ferguson** (1997); **Sánchez-Tabernero** (2000); **Terribas** (2002); **Bardají**; **Gómez-Amigo** (2004); **Blanco-Mallada** (2005); **Camacho-Ordóñez** (2005); **Catela** (2005); **Medina-Laverón** (2006); **Bonaut-Iriarte** (2010); **Ferrer-Ceresola** (2018).
	Innovation	*The Broadcasting Research Unit* (1989); *Prix Italia* (1985); **Blumler** (1991); **Lasagni**; **Richeri** (1995); **Terribas** (2002); **Bardají**; **Gómez-Amigo** (2004); **Medina-Laverón** (2006); **Bonaut-Iriarte** (2010); **Pujadas** (2011); **Guerrero**; **Etayo** (2015).
	Creativity and originality	**Blumler** (1991); **Albers** (1992); **Sánchez-Tabernero** (2000); **Terribas** (2002); **Medina-Laverón** (2006); **Ferrer-Ceresola** (2018).
Technical realization **Albers** (1992); **Martínez-Abadía** (1993); *GECA* (1995); **Medina-Laverón** (2006); **Tur-Viñes** (2006); **Ojer-Goñi** (2008).	Excellence and style. Technical, technological, and esthetic quality. Adequate presentation	**Lasagni**; **Richeri** (1995); **Sánchez-Tabernero** (2000); **Gutiérrez-Gea** (2000); **Zabaleta-Urkiola** (2005); **Catela** (2005); **Cardwell** (2007); **Pujadas** (2011); **Bonaut-Iriarte** (2010); **Ferrer-Ceresola** (2018).
	Production. Graphic and visual effects, diverse shots, and cameras	*Prix Italia* (1985); **Martínez-Abadía** (1993); **Saló** (2003); **Camacho-Ordóñez** (2005); **Zabaleta-Urkiola** (2005); **Medina-Laverón** (2006); **Tur-Viñes** (2006); **Lu**; **Lo** (2007); **Ojer-Goñi** (2008).
	Sound	**Albers** (1992), **Ojer-Goñi** (2008)
	Lighting	**Albers** (1992); *GECA* (1995); **Saló** (2003); **Medina-Laverón** (2006); **Tur-Viñes** (2006); **Ojer-Goñi** (2008).
	Music	**Lu**; **Lo** (2007); **Ojer-Goñi** (2008); *The Wit* (2016).
	Set, scenery, and costumes	**Albers** (1992); *GECA* (1995); **Saló** (2003); **Camacho-Ordóñez** (2005); **Tur-Viñes** (2006); **Ojer-Goñi** (2008); **Guerrero**; **Etayo** (2015).
	Production, the importance of planning	**Leggatt** (1996); **Camacho-Ordóñez** (2005); **Tur-Viñes** (2006); **Cardwell** (2007); **Bonaut-Iriarte**; **Grandío-Pérez** (2009); **Martínez-Gallego**; **Gómez-Mompart**; **Bordería-Ortiz** (2010); **Pujadas** (2011); **Ferrer-Ceresola** (2018); **Verhoeven** *et al*. (2018).
	Adequate funding and viability	*The Broadcasting Research Unit* (1989); *Prix Italia* (1985); **Camacho-Ordóñez** (2005); **Pujadas** (2011); **Verhoeven** *et al*. (2018).
	The presenter and copresenters, with a great cast of actors and guests	**Albers** (1992); *GECA* (1995), **Thompson** (1996); **Eastman**; **Ferguson** (1997); **Saló** (2003); **Zabaleta-Urkiola** (2005); **Camacho-Ordóñez** (2005); **Tur-Viñes** (2006); **Lu**; **Lo** (2007); **Bonaut-Iriarte**; **Grandío-Pérez** (2009); **Silva** (2010); **Guerrero**; **Etayo** (2015); **Ferrer-Ceresola** (2018).

Awards and reviews	Receipt of awards for their work and stimulating of reviews	*Prix Italia* (1985); **Thompson** (1996); **Medina-Laverón** (2006); **Ojer-Goñi** (2008); **Bonaut-Iriarte** (2010); **Pujadas** (2011); **Ferrer-Ceresola** (2018); **Verhoeven** *et al.* (2018).
Audience	Audience on set. Viewer involvement, satisfaction, and commercial purpose	**Albers** (1992); **Thompson** (1996); **Eastman**; **Ferguson** (1997); **Saló** (2003); **Catela** (2005), **Bianculli** (2007); **Pujadas**; **Oliva** (2007); **Martínez-Gallego**; **Gómez-Mompart**; **Bordería-Ortiz** (2010); **Bonaut-Iriarte** (2010); **Ferrer-Ceresola** (2018).
	Participation. Social networks and opinion	**Albers** (1992); **Medina-Laverón** (2006); **Ojer-Goñi** (2008); **García-Matilla**; **Arnanz** (2011); **Ferrer-Ceresola** (2018); **Verhoeven** *et al.* (2018).
	High audience figures	*Prix Italia* (1985); **Gordillo** (2009); **Ferrer-Ceresola** (2018).
Context **Lasagni**; **Richeri** (1995); **Martínez-Gallego**; **Gómez-Mompart**; **Bordería-Ortiz** (2010).	Commercial economic performance. Distribution, advertising, self-promotion	*Prix Italia* (1985); **Albers** (1992), **Cortés** (2001); **Pujadas** (2001); **Blanco-Mallada** (2005); **Catela** (2005); **Medina-Laverón** (2006); **Pujadas**; **Oliva** (2007); **Verhoeven** *et al.* (2018).
	Cultural–economic environment, social value, political and legal system	**Catela** (2005); **Videla-Rodríguez**; **Sanjuán-Pérez** (2006); **Martínez-Gallego**; **Gómez-Mompart**; **Bordería-Ortiz** (2010); **Pujadas** (2011); **Ferrer-Ceresola** (2018); **Terán** (2019).
	Competence	**Eastman**; **Ferguson** (1997); **Cortés** (2001).
	Luck	*GECA* (1995); **Sánchez-Tabernero** (2000).

3. Methodology

Entertainment is the main raison d'être of television (**Antona-Jimeno**, 2017), leading to the establishment of a wide range of programming formats with overwhelming audience figures, because "to entertain properly is as necessary as to educate or inform accurately" (**Guerrero**, 2013, p. 11). According to **Medina-Laverón** (2006, p. 47), true entertainment is related to "humor, talent, and innovation." It is easy to criticize the frivolity of television (**Catela**, 2005), but journalistic humor professionals take the social dimension of their work very seriously, as "it constitutes healthy exercise" (**Meléndez-Malavé**, 2005, p. 90).

In accordance with **Graham** (1999, p. 45), quality indicators and standards in entertainment (**Guerrero**; **Etayo**, 2015) are considered to be related to experience, and this is what promotes success, in addition to budget constraints and technical expertise. Evaluation against these objective criteria can be used to develop a product that captures the audience, according to **Diego-González**, **Etayo-Pérez**, and **Pardo** (2011), who add to a stream of research that compares the opinions of professionals involved in the production process, along with **Albers** (1992); **Lasagni** and **Richeri** (1995); **Leggatt** (1996); **Ishikawa** (1996); **Gutiérrez-Gea** (2000) or **Soto-Sanfiel**; **Villegas-Simón** and **Angulo-Brunet** (2021).

According to the aforementioned proposals, we carried out a chronological review of humor journalism programs broadcast on Spanish free-to-air generalist channels (*TVE*, *La 2*, *Antena 3*, *Telecinco*, *Cuatro*, and *La Sexta*) from 1990 to 2015. The term "humor journalism programs" was coined by **Acevedo** (1971) to emphasize formats that deal with current affairs using accurate and rigorous journalistic procedures, regardless of the time allocated, that is, whether a whole broadcast or just a section. **De-Castro-García** (2020) believes that they provide a "perfect" way of informing, making the public laugh while using high-quality information and reliable sources.

Using these premises, this term is reformulated within infotainment, a macro-genre that includes thousands of hours of broadcasting, while excluding humorous programs without any current affairs element such as bloopers, stand-up comedy, joke shows, or improvisation programs. To identify such programs, data from magazines and television programming web portals, such as *TP* or *Vertele*, were crossed against the lists of formats in the *GECA* yearbooks and the start and cancellation dates published in media such as *El País*, *El Mundo*, or *ABC*. A proprietary database was thereby created, including 105 formats that mix humor and information, as described by **Gascón-Vera** (2022). Among these, the longest-running programs were identified, as a parameter of success, thus yielding seven examples that were broadcast for five years or more:

- *Caiga quien caiga* [*CQC*] (*Telecinco*, 1996-2002/2005-2008; *La Sexta*, 2008; *Cuatro*, 2010).
- *Crónicas marcianas* [*CM*] (*Telecinco*, 1997-2005).
- *La noche con Fuentes y Cía* (*Telecinco*, 2001-2005).
- *Buenafuente* (*Antena 3*, 2005-2007; *La Sexta*, 2007-2011).
- *Sé lo que hicisteis* [*SLQH*] (*La Sexta*, 2006-2011).
- *El intermedio* (*La Sexta*, 2006-present).
- *El hormiguero* (*Cuatro*, 2006-2011; *Antena 3*, 2011-present).

Although Annex I presents other noteworthy formats with less time on air, these seven represent a significant sample that indicates that this type of program is ephemeral, although there are also successful cases with only one program per season (Annex II), in accordance with the three assumptions supported in the programming studies by **González-Aguilar** (2020), **Béjar-Cortés** and **Pérez-Rufi** (2020), and **Puebla-Martínez** (2013). More specifically, priority

> A desire to improve the world can also be achieved from the set of a television program

was given to the pilot or last program of the season, as well as its highest audience figures or a special program. As a final resource, availability was considered, given that the main limitation was the availability of broadcasts, for which the archives of *Mediaset* and *Globomedia* were accessed.

For the content analysis, nine categories were used, including the following data: season, date, channel, structure, humorous resources, content and production, aspects of creation, participation, and advertising elements. These result in a total of 50 variables based on the abovementioned indicators. Nearly 200 hours were watched to determine the structure and establish the targets of the interviews among those working in the productive, creative, and executing processes (**Pérez-Pereiro**, 2007).

A methodological triangulation was applied to guarantee the reliability of the study by applying different techniques and complementing several points of view (**Puebla-Martínez**, 2013) for such a dynamic object of analysis (**Fernández-Jiménez**, 2018). A strategic selection of experts (**Chicharro**, 2003) was carried out to explore the characteristics of their work routines (**Giddens**, 1995), to achieve a global perspective through which to infer the importance of their experience.

Table 2. List of professionals interviewed

	CQC	Crónicas marcianas	La noche	Buenafuente	SLQH	El intermedio	El hormiguero
Presenter	El Gran Wyoming (José Miguel Monzón)	Xavier Sardà	Manel Fuentes	Andreu Buenafuente*	Ángel Martín Patricia Conde*	El Gran Wyoming+ Sandra Sabatés	Pablo Motos*
Executive Producer/ Director	Eduardo Arroyo		José Miguel Contreras	Joan Grau	Juan Andrés García Ropero	Carmen Aguilera	Jorge Salvador
Script Manager	Cristina López	Xavier Vidal	Amando Cabrero		Óscar Arenas	Sergio Sarria	Sergio González
Editorial Manager	Belén Fernández		Camino Hontecillas	Marcos Mas	Samantha González	Antonio Arráez	
Production Manager	Miguel Turón	Albert Grau	Víctor Martín	David Felani	María Eugenia Rodríguez	Marián García	Kike Perdigones
Director	Fernando García	Alex Miñana	Oriol Bosh	David Guillén	Cristina Escudero*	Diego Santos	Alex Miñana+

Note: The interviews were carried out from 2020 to 2022. Three requests were rejected*, being supplemented by the other interviewees. +These two professionals answered twice, as they worked in two formats.

The questions that were asked (Table 3) were also based on the measurement of academic success, with the aim of finding synergies, identifying significant differences, and confirming the indicators, according to the professional profile of some of the interviewees with a leading role in the history of television entertainment (**Aguilera-García**, 2022). Owing to their recognized career, meeting these professionals was difficult but was achieved satisfactorily through different forms of coverage, with the purpose of facilitating access to each team, according to their needs.

The in-depth interviews with the team from *El intermedio* were carried out on its set, as well as with colleagues from previous formats; interviews were also carried out at the *Movistar+* headquarters with the directors of *Caiga quien caiga* and *Sé lo que hicisteis*, and at the production company of *El hormiguero*. Meanwhile, the experiences of *Crónicas marcianas*, *La noche*, and *Buenafuente* were completed via telephone and video call, always lasting more than 30 min and reaching 60 min on seven occasions.

The 34 transcripts were then coded by using the *Atlas.Ti 8* analysis tool with the matrix shown in Figure 1, which in turn interrelates Tables 1 and 3, according to the five main factors of the theoretical study that were addressed through the questions above.
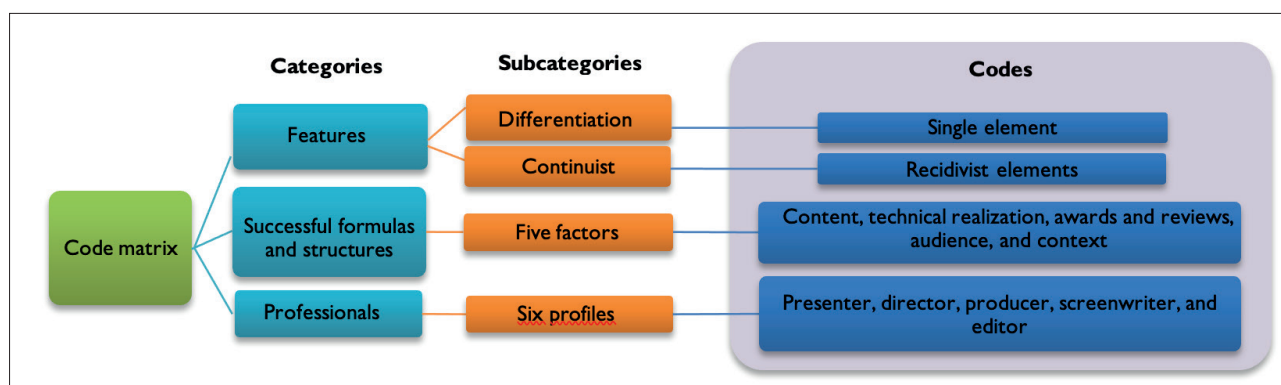
Figure 1. The coding method used in the evaluation of the in-depth interviews

Table 3. Questions asked in the interviews according to professional profiles

Presenter:	Director/executive producer
1. What do you consider to be the main aspects of programs that mix information and humor?	1. What genre do you think the format belongs to?
2. What would you highlight about the use of information in humor programs? What is the most difficult thing to deal with under the umbrella of humor?	2. What are the key aspects of your program?
3. What ingredients do you think a successful program should have?	3. What other formats are in direct competition, and what differentiates them?
4. What can be the determining factors for the failure of a format on television?	4. In your opinion, what are the characteristics of humor journalism?
5. What is the ideal number of sections and copresenters?	5. What are the ingredients of a successful program, and what aspects help to make it successful?
6. Which professional profiles are essential for a successful format?	6. How would you specify the target audience of the format? Has it undergone changes?
7. Do you think that changes are necessary between seasons and/or within the same season?	7. What are the main adaptations and the reasons for them?
8. Among all the humorous resources, which are the most important for you?	8. Successes and failures of content: what has worked best and worst?
9. Which elements of production are noteworthy in this type of format?	9. What are the reasons for changing, eliminating, or creating new sections?
10. What is the best formula for live or recorded broadcasts?	10. What are the main reasons for choosing a contributor?
11. What is your favorite scenography?	11. What are the usual topics in the program's rundown? Has the program created its own topics?
12. Would you highlight any award received and/or any review you have received?	12. What aspects of the production are characteristic, and what ele13. ments should the scenography have to be more attractive?
	13. Would you highlight any award received and any review?
Head of script:	**Editor in charge:**
1. What are the keys that differentiate the format? What are the characteristics of the script?	1. What are the main characteristics of the information that is treated with humor?
2. What are the resources that enable success?	2. What is the degree of importance of the information in the format?
3. Which elements have been incorporated from other programs?	3. How would you define the main topic covered in the program?
4. Does the length of the format vary? How has that been achieved?	4. What has been the most complicated topic to deal with?
5. What resources made the program entertaining?	**5. What are the difficulties in achieving success?**
6. What makes it entertaining?	6. How has the editorial process evolved?
7. What are the most difficult types of content to script?	7. How is the documentation process carried out?
8. What jokes or elements do you use to dynamize the script?	8. Are there any format-specific issues?
9. What resources do you use to build audience loyalty?	9. How is the length of each topic determined?
10. What are the identifying humorous resources?	10. Do current events change the script once it is closed?
11. Is the script literal, or is there room for improvisation?	11. What audiovisual resources are most commonly used?
12. How are the sections woven together	12. Does the audience determine the topics?
13. How many times is the script rewritten?	
Production director:	**Director:**
1. What is the type of production and its characteristics?	1. What aspects differentiate the direction of the format?
2. What are the advantages and disadvantages of producing a comedy format in a production company outside the network?	2. How are the direction aspects decided?
3. What elements would you highlight in the production that help the programs to be successful?	**3. What resources help the success and recognition of the format?**
4. What are the differences between the production and others?	4. What have been the changes and evolution of the scenography?
5. How is the team organized?	5. How would you describe the scenography? What identifies it?
6. What is your daily workflow like?	6. How was the scenery designed? Which props and objects are most commonly used?
7. What is the number of workers needed, and what tasks are essential for a successful format?	7. What are the main characteristics of the lighting of the program compared with others?
8. How have the guests varied on the program?	8. Which camera shots are used most often?
9. What are the exterior locations of the program? Which trips stand out?	9. How many and which type of cameras are used?
10. What distinguishes the style of the program?	10. What is the feature that makes the format recognizable?
11. Can we estimate the budget? If not, is it appropriate?	11. What identifies the graphics used?
12. What is the commercial potential of the program?	12. What is the musical setting, tuning, music, etc.?
13. How is audience participation managed?	13. How many people are in the audience? Is the audience important for the development of the format?

Note: To differentiate them, elements related to the indicators of academic success are underlined, while direct questions on resources for success are highlighted in bold.

This process favors internal validity by using a single analysis instrument, while the external validity of the study was based on the credibility of the experts and their demonstrated success.

4. Results: keys to the success of humor journalistic formats

This method was used to challenge the factors for success and expand them by applying the 100 categories resulting from the coding. These results are quantified in Figure 2, where first value reflects the number of mentions in the interviews, while the second describes their interrelation with other indicators.

This was then linked by the professionals to the news resources and the main topics related to the main theme and current affairs. These, together with the script, the relationship between programs, and the scenography, emerge as the

most important features of success. They would thus be the most representative, followed by the guests, the characteristics of humor journalism, the organization of the team, and the support from the network. On the other hand, the least frequently mentioned features were the programming, the number of sections, and the contributors, as well as the humorous resources themselves, subdivided into different formulas such as irony or imitation and grouped in terms of originality and staging, resulting in structural changes that are intertwined with the budget.

Figure 2. The 100 categories defined after the coding of the in-depth interviews for the success analysis

The common factors of the seven analyses are based on two popular channels: *Telecinco* and *La Sexta*, while *Antena 3* and *Cuatro* created *Buenafuente* and *El hormiguero*, which (together with the three readaptations of *Caiga quien caiga*) demonstrate how humor journalistic hits can switch channels while retaining their audience. To achieve this, an initial effort is required from the channel to "polish" the format, as suggested by *CQC*'s scriptwriter, Cristina López, and emphasized by its director, Eduardo Arroyo, who recounts how "the channel put up with a fourth change of Sunday noon programming."

This finding is also confirmed by the commitment of Paolo Vasile, CEO of *Mediaset España*, to *La noche con Fuentes y Cía*, as well as by the fact that *El hormiguero* (*Cuatro*) and *El intermedio* and *SLQH* (*La Sexta*) debuted at the same time as their channels. In this regard, the director of *SLQH*, Juan Andrés García Ropero, emphasized the time to "mature" and being fortunate enough to keep on trying until it became a daily program, as happened with the latter three projects. Therefore, success can result in the expansion of the program, although one should not forget the risks. In this regard, the producer of *SLQH*, María Eugenia Rodríguez, considers breaks to be necessary.

Successful formats change the rules of programming; for example, *El hormiguero* forces programming schedules to adapt to its end time, which Jorge Salvador, its executive producer, considers to be "a compliment." Pre-prime-time and late night are the favorite slots for successful launches, including important examples such as The Late Show with David Letterman (*CBS*, 1993-2015), Johnny Carson's interviews, or John Oliver and Jon Stewart on *The Daily Show* (*Comedy Central*, 1996-present).

In terms of their origin, *CQC* is the only example of an adaptation from Argentina, but adaptation of radio programs is common, including *El hormiguero* from *M80*'s version of *No somos nadie* and *Crónicas marcianas* from *La ventana* on the *SER* network. "It was hard for us to find the formula. We came from radio, and everything was new", said Xavier Sardà, director and producer of *CM*, about their adaptation to the television genre.

The origins of the examples are interrelated. *La noche* continues the project of *El club de la comedia*, from which Pablo Motos, as script coordinator, created *El hormiguero*, using the set and team of *Crónicas* and its production company *Gestmusic*, which (together with *Globomedia* and *El Terrat*, now *Mediapro*) manage them.

In terms of agenda setting, the topics covered exhibit a high informative content that alters its running content. Manel Fuentes, interviewed as a presenter of *La noche* as well as a member of *Crónicas*, recalls that the assassination of Ernest Lluch made the program "stand out" as a result of its journalistic skill. Likewise, *La noche* was redefined as an "absolutely serious" program by present debates on the Iraq war with all political parties, as confirmed by its executive producer and director, José Miguel Contreras. Here, they achieved their highest audience figures, as with the *Crónicas* special on the 11-M terrorist attack, one of the most complicated issues to deal with according to the newsrooms. "Current events run you over; it doesn't matter what you have written because what happens is the most important thing", reveals the head of *SLQH* and member of *CQC*, Samantha González, about the crash of Spanair flight 5022.

Likewise, Belén Fernández, part of the editorial staff of *CQC*, advocates that the journalistic tone of such programs should be supported by management. In her opinion, "the script load was huge" but "without the writers who provide the information, the scriptwriter is nobody." She is thus in favor of a partnership in which the journalist ensures that "the information is correct" while the script "rounds it off" as also reinforced by Carmen Aguilera, director of *El intermedio*.

In this sense, the managers emphasize their contacts with traditional sources, agencies, press offices, and media, from *Interviú* to the *Yellow Pages*, in contrast to the digital media and social networks that have now become "a source of

information", according to Camino Hontecillas from the editorial office of *La noche*. According to Joan Grau, deputy director of *Buenafuente*, the development of humor journalism enables a wide range of tones, expanded by Ángel Martín, presenter of *SLQH*, to include humorous, ironic, or parodic, while González, from *CQC*, links them to current affairs. "Without current affairs, *Crónicas* would not have existed", says Xavier Vidal, editor of *CM*, presenting the examples of the debates on euthanasia or corruption and the differential content on reality television and sex.

> " Successful humor journalistic programs combine two or more political, social, or television issues, from which they delve into conflicts such as the economic crisis, political corruption, the war in Iraq, the independence of Catalonia, or ETA "

> "Perhaps one of the keys was that we did not have a rigid schedule of topics. Each morning, we decided what the program would be that night; there were no constraints or molds. We included debates, humor, current affairs, interviews, esotericism, or sports, in the best combination we thought the audience would like". (Xavier Sardà)

As part of this miscellany, the politics of *CQC* were added to sports, society, and according to its director, Fernando García, ending with "the most expected", the international report. For Arroyo, this content "no longer exists" as it requires larger budgets, although he also points out the reports by *El intermedio* on refugees, health, or historical memory, which have become "signs of identity" from which to defend human, social, and civil rights, according to its director. These are the same informative keys that a newspaper or television news program covers, according to its editor-in-chief, Antonio Arráez. Marcos Mas, scriptwriter at *Buenafuente*, states that any news item can provoke laughter by using humor that identifies with the audience and deals with something that matters, as shown in Graph 1.

"We tried to make sure that all content was combative, because the basis of humor is the defense of the weak", says Contreras, also noting that they included anecdotes, just like Buenafuente, and that they added social stories in *El hormiguero* and *SLQH*, where they denounced the bad practices of gossip magazines. Current affairs share coverage with topics such as the monarchy in *Crónicas*, the Church, and refugees in *El intermedio*, and social events such as the wedding of the daughter of the then prime minister, José María Aznar, who was the target of humor in all formats, always departing from the news as presented by the bellwether media for a particular synergy.

"The program became news", noted the head of *SLQH's* editorial staff, while Arroyo explains how they could ask questions "more brazenly." According to Sardà, this capacity to generate media interest, in the case of *Crónicas*, was owing to "the tenacity of the editors to pursue the most elusive characters" who said and did things that "they would not do on any other set" and that began to nourish the network.

The production director of *Buenafuente*, David Felani, reveals how celebrities asked to be invited, and Contreras recalled that, on *La noche*, "very significant celebrities" attended "in a natural way", including three types: the powerful, the good, and the interesting, according to its production director, Víctor Martín. A preliminary meeting was held with them to generate a story of interest from a script that corresponded "to one of their most emotive periods", as described by Amando Cabrero. The same idea is supported by Óscar Arenas, scriptwriter of *SLQH*, when he reported that they wrote ten pages.

The most recent contributors are the most faithful to their script, playing with the element of surprise on *Buenafuente*, according to Joan Grau, which is usually rehearsed, being divergent in *SLQH*, on which it is never fixed. Turning this defect into a virtue, "Patricia Conde found jokes by reading them from the teleprompter", according to García Ropero, who stated that "they showed their seams", that is, that the format was live.
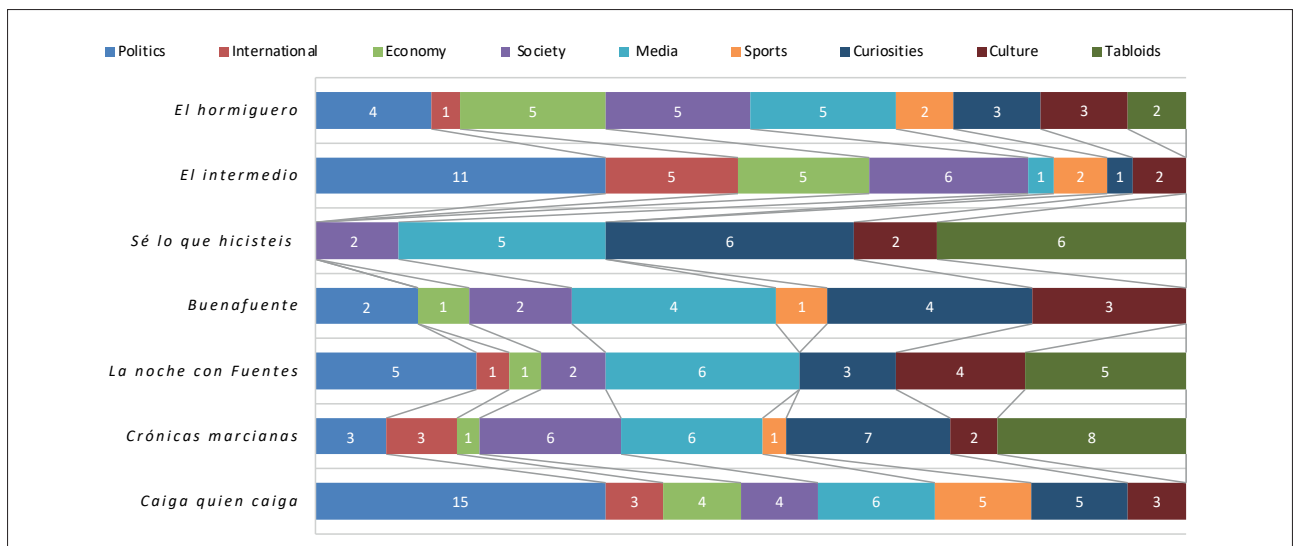
Graph 1. Preeminence of the themes in the viewings
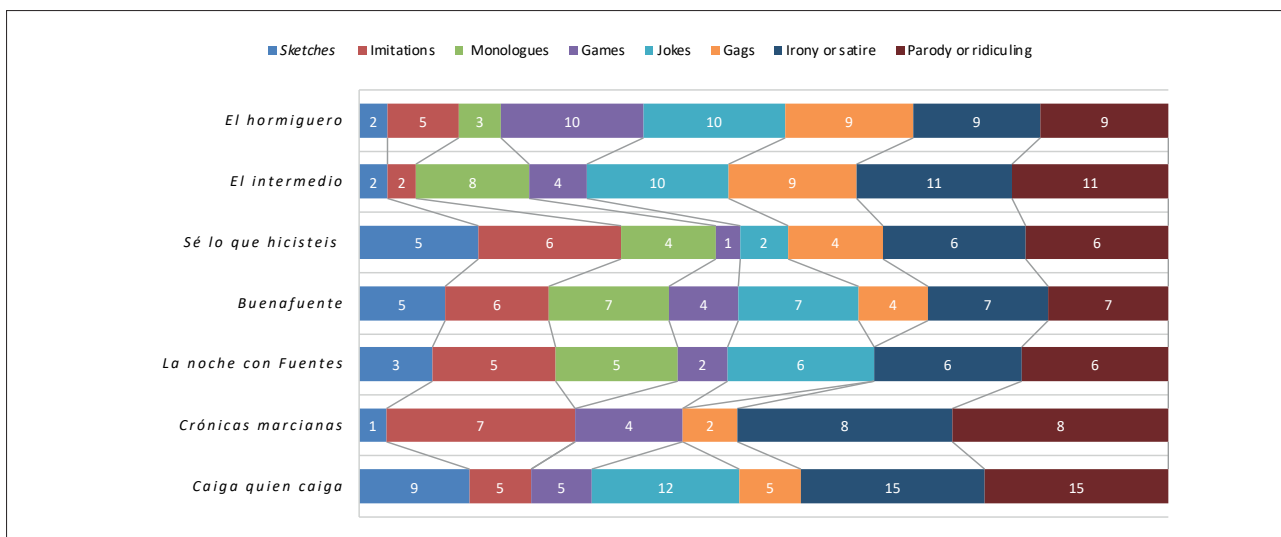
Graph 2. Distribution of humorous resources for each broadcast

These formats typically use techniques such as irony and parody, more commonly than games, jokes, or monologs.

For production director Miguel Turón, *CQC's* humor was marked by the three comedians around the table: Wyoming, with "his authenticity", Juanjo de la Iglesia as "the serious counterweight", and Javier Martín with a "wackier" profile. They performed parodies and sketches based on advertising or films, according to the director. "Everything was scripted, and everything worked", recalled its director, who retained the section on journalistic ethics, while he considered Wyoming's editorial line to correspond to the current "look." An opening monolog, rankings, or the first science of Pablo Motos were part of the structure of *La noche*, according to Hontecillas, along with promotional sketches, as in *CQC*.

Crónicas' humor was created from a rich universe of characters brought to life by Boris Izaguirre, Mariano Mariano, Javier Cárdenas, or Juan Carlos Ortega. "More than imitations, we did parodies with El Neng or Rodolfo Chikilicuatre", said Grau of *Buenafuente*, who identifies for his easy-to-digest, clean humor from the monolog, his main tool.

For Arenas, the characters, despite being very complicated to create because of the great potential for errors, favor running gags as in *SLQH* and its recurring sketches. This started with clones and, later they were not able to use images from *Telecinco*, as a production on the set, just like *El intermedio*, which is recorded next door. However, from his script, Sergio Sarria, details that easy jokes are not enough for them; rather, "there has to be reflection", and so, the newspaper library and the section *El pico de la mesa* work "better", as well as *Los vídeos manipulados*, which are considered to be "a discovery" by Wyoming. The fresh and recurring humorous works in *El hormiguero*, where Latre imitates as in *Crónicas* and whose music is also a transposition, as well as the stand-up comedy of *La noche*, are also pointed out by Sergio González, the coordinator of scripts and writing.

Therefore, these are overlapping ingredients that achieve a similar aim. As stated by Contreras, they have been "always" been addressing "the same audience" comprising the segment of middle-aged people with an "urban mentality in favor of social justice", thereby attracting attention from the commercial world, and that has grown throughout their development on television, concludes Salvador. To achieve such loyalty, López describes the bond between the collaborators in *CQC* as "key", "having very different profiles that cover the whole spectrum of the audience." This idea also emerges from the personality of each of the reporters, such as Tonino or Pablo Carbonell, who Arroyo states is the most versatile and reveals that he was requested by Wyoming, who continues to drive *El intermedio*, as well as Manuel Fuentes in *La noche* and in *CQC*, which later included Frank Blanco, both of whom are participants in *CM*. Likewise, Silvia Abril only includes Sabatés and Conde as females in some slots created ad hoc on the basis of the personality of some presenters adored by the public.

> "Sardà never gave up the fight. In one episode, he called George Bush a 'son of a bitch' (...). The people who watched us wanted sincerity, like saying things the way we really thought they were. When he spoke, he gave his opinion; he tried to be fair, but he did not hide and gave the program an incomparable rage and strength". (Xavier Vidal)

For the presenters Sardà, Fuentes, and Martín, it is important to be direct; Buenafuente, Motos, and Sardà are their directors and achieved the role of opinion leaders, in tune with a large team of collaborators who provide originality and spectacle since "a program is a score that they must play", says Sardà. Likewise, Contreras highlights the daring role developed by Enrique Sanfrancisco,

Becoming the driver of programming has proven to be a formula for success. *La noche* and *El hormiguero* bring together the star system, not only Spanish, and create star moments through the guests, who are indispensable figures in humor journalism

Eva Hache, Quequé, or Ángel Martín using the same formula as in *Buenafuente*, whereby Mas points out that they enrich these formats, although this approach results in the complication of creating new ideas each season, says Salvador.

The production director of *CQC* explains that the networks "rarely" create, produce, and broadcast this type

> Sardà highlights the complicity of humor and the need to share cultural references, for example, with the imitations of George Bush and José María Aznar that Carlos Latre used to do

of program. Meanwhile, from *La noche*, Víctor Martín, states that his creative process "does not fit well with the formulas of a large network." Although the producer of *El intermedio* and the deputy director of *Buenafuente* do not have a common opinion on the details, they report a greater agility by offering "absolute value", in terms of both technical means that guarantee they "have all the materials to recreate what the scriptwriters create", in the words of Rodríguez, as well as the specificity of current affairs humor, as supported by the producers of *Buenafuente* and *Crónicas*.

"There was never any financial limit; everything was available at once, from animals to cars", confirmed this producer. Felani confirms this in *Buenafuente*, where "they didn't say no to anything" and that Kike Perdigones, producer of *El hormiguero*, joined his approach of spending as little as possible: "It sounds impossible, but that's what the production is based on."

This task requires a symbiosis between departments. Grau summarizes that "the best team" must be chosen based on talent, while Perdigones nails it when referring to "making television history" and maintaining this intensity after the success of the program. To achieve this objective, they work on the basis of the requirement to make the best possible program each night, a challenge shared by Aguilera and Sardà when evaluating their personal satisfaction over the years.

On-screen broadcasting of these programs ended owing to different circumstances. Cabrero recalled that *La noche*, despite having "a dream audience", suffered a "disastrous" budget reduction that, according to Contreras, made them lose creative capacity. *Buenafuente* suffered the same situation, going from a prime-time budget on *Antena 3* to having "considerably less than half", lamented Grau. In the case of *CQC*, its director confirmed that the audience was not the real reason for its cancellation, since they reached the agreed share of 20%; rather, he points at a change of model and *Mediaset*'s shareholding. However, the drop was a determining factor in *SLQH* and *Crónicas*.

Innovation in humorous programs has been proposed using different resources, such as sound effects, editing of cut reports with jumps, graphics, and vertiginous production with very fast camera movements combined with a live band.

Set design is another interesting aspect to keep the audience engaged, although for Arroyo it was "secondary" and reminiscent of an industrial design, a clandestine garage, or a space station. In addition, the whole team wore black suits, white shirts, and the glasses that identify *Caiga* Argentino, as indicated by the production team. His counterpart, Albert Grau, recalled that *Crónicas* also applied uniforms for its "Martians" and that the wardrobe was "fundamental" for the imitations.

"The set was groundbreaking, it was different", recalls director Alex Miñana, who recounts the entrance to the pyramid and its "walkable" table, which they reached with autonomous cameras. The night was marked by the stage of the Teatro Alcázar, where the audience experienced "a direct and unique resource", as did the guest, said Contreras. This was "a point in favor, as with Letterman in New York", according to Fuentes, who also had difficulties that Bosh solved with a stage that went into the box seats, a system of mirrors to give depth, and locating the band in the amphitheater. All this was combined with the pioneering use of smoke and high-contrast lighting for an underground look, adds the director. The audience experience is also added in these formats.

For the audience "Andreu was a star", says Felani at *El Terrat*, while his director, Guillén, admits to becoming ashamed of the scenography over time, a sign of "everything that was learned and improved." He also stresses the importance of the props and his "fetish elements": the red curtain and his commitment to live music. Regarding *SLQH*, its set grew until becoming a sitcom-like bar by episode 1,001, the last before its cancellation. García Ropero quantified that, in an hour, they could broadcast 40 videos, a number that could be 100 in *El intermedio* using a method perfected by its director Diego Santos, who details that they had limited scenographic changes directed toward "calm" and with lighting from above.

Successful filmmakers agree that content takes precedence over esthetic as a priority. "You think about what is happening and how to convey it to the viewer", adds Miñana. For Oriol Bosh, the approach at *Globomedia* tries to make the production work in service of the script, which should not be distorted, according to David Guillén, from *Buenafuente*. In terms of videos, in *El hormiguero*, González points out that they organize the sections with "an emotional roller coaster of emotions" as a guideline, always with surplus content programmed in case it is needed. As in *Crónicas*, both have an extra half hour available, and the order is determined live by the production team. "Sardà had a graphic tablet and would warn of changes in the order of the videos", recalls Miñana, along with the statistic that they had 100 videos a day but only used 20-25% of them.

To understand the external factors influencing success, it is necessary to point out that *CQC* received awards from the *Academy of Television*, *Ondas*, and *TP* in the entertainment and best program categories, as also confirmed in the cu-

rrent sample, but not in the script category, which *El intermedio* did receive. "These programs are always seen as a poor brother and they are at a similar level", considers Arroyo, who together with the rest of the people in charge, is grateful for these prizes, which for *Crónicas* and *El hormiguero* have become international. However, Contreras emphasizes that these correspond to trends, as does Sardà, who believes that, when the reviews fade away, "all that remains is the trace of the work done with the utmost honesty and the maximum tenacity to entertain people at home."

Regarding public success, López concludes that "the audiences achieved by *CQC* have not been seen again", which he attributes to its great characteristics and how "the effort and the enthusiasm of its team" was reflected in "the affection that it generated." According to Contreras and Fuentes, *La noche* was the late-night program that has worked best in history, receiving a high audience share, with the exception of *SLQH*, which maintained an average of 8%. "We knew we had support; the presenters had a fan club, people sent emails... when there is feedback, it's a good sign", says the head of the newsroom of this latter program.

This success was owing to the fact that they had a "very high participation thanks to very well-trained people", recalled Fernández, adding that they received many letters, faxes, SMSs, and emails. These formulas are now "obsolete", according to Víctor Martín, which Albert Grau also mentions and links to the fact that *Crónicas* forged a successful brand for merchandising discs and DVDs. The same occurred with *CQC*, which became a bellwether for *Globomedia* and profitability for *Telecinco*. "We achieve a perfect symbiosis, because we create a novel product and receive a few minutes from a celebrity to which we would not have access", says Perdigones, giving both qualitative and quantitative importance to the audience.

Regarding the time slot, "not having competition was a marvel (...) it simulated a live show while all the channels were broadcasting TV movies." This is how López referred to the fact that *CQC* was programmed in a "convenient" time slot thanks to highly differentiated products such as motorsports. *La noche* also did not compete with other late-night programs, since it was a weekly program, so it was an advantage to have its own slot. In contrast, a daily program "must fight a different battle every day", said Jorge Salvador, who contrasts his experience with the strong competition they have had among themselves: "The audiences mattered to us to a certain extent; if nobody sees you, you're out of a job. But we didn't dream of beating Sardà, although we overtook him quite soon", clarified Joan Grau, while Sardà himself emphasized the importance of daily work: "You can't waste a single minute of screen time." To this end, he is committed to captivating the viewer with a differentiated format based on "novelty, uniqueness, and surprise through talent and excellence."

From these anecdotes, one can also deduce that the success of such programs depends on "chance", which is related to being created with the support of the network, being able to create content freely, or having the public present during each recording.

5. The formula of the TV hit makers

> "*CQC* was very modern and made a great contribution. It even included politicians, who participated in something that was happening in spite of them. They were "gentlemen" who did not mix with the people. This is a response to a very low-intensity democracy". (El Gran Wyoming)

The key to *CQC's* success, according to its director, Edu Arroyo, was that "it presented the figure of the reporter as never before: tongue-in-cheek but with weighty questions and content." He also stated that it was "very original" because of the "black suit and the glasses." They even managed to deliver them to the then King of Spain, Juan Carlos I, which, according to its production director, Miguel Turón, was "his greatest success", as it became like "a model." It "dealt with politics in a fun and familiar way", a trademark that "avoided their being standardized", even nowadays, and according to its head of script, Cristina López, they were different in the sense that they were "very scathing." Along the same line, its head of writing, Belén Fernández, emphasizes the triumph in "being the first to deal with the current events rigorously from a different point of view", using a humorous-satirical tone emphasized by its director, who achieves "a vertiginous realization", using quickfire shots.

> "It is very difficult to identify the elements required for success, but they include freshness, having a good creative team with talent, and a sense of humor through a sense of freedom and an appropriate editorial line defined by the executive producer". (Albert Grau)

From the newsroom, Xavier Vidal focuses on technical quality: "We had to present a flawless television product; ethically, everyone had a say, but it could not be technically flawed." This idea was added to the fact that it had to be interesting: "The guests had to be present, the debates had to be passionate, and the topics had to have a social scope."

As defined by its presenter and director, Xavier Sardà, success relied on creating, in an honest fashion, "a different, fresh and original product (...) as if you only did one episode in your life, and even more so because it is a night program, because people want to enjoy themselves at the end of the day." Therefore, he warns that even the thorniest issues must be addressed on televi-

> Regarding their viability, for the head of production of *SLQH*, they received a great budgetary commitment before the crisis, through a very high level of production

sion, in which regard the director Alex Miñana emphasizes the importance of music together with a production that prioritizes showing what is happening over esthetics. This is a recipe for success that he also used in *El hormiguero* and that he complements with the use of autonomous cameras, well-lit areas, simple shots, and large amounts of videos and graphics.

> "To achieve success, you have to handle relatively simple elements, but the mix is not easy (...). The key to success in TV language and communication is to achieve personality through an interesting point of view". (José Miguel Contreras)

> " Successful results correspond to a strong idea developed from a constant relation between professionals and production companies linked to the success of humor journalism and with experience from other media in the audiovisual field "

The executive producer of *La noche con Fuentes* moves away from the obsession with the audience, as well as from the other extreme: a program with great deepness but that neglects the audience. In addition, he favors the involvement of an author in a "very curious" format, combining the needs of the team with personal concerns and political situations.

The context is key to launch a product in which "success has to be quantitatively sufficient, good enough for the decision-maker to continue believing from growing audience ratings, but also qualitatively, because it has to satisfy the requirements I learned at the Faculty of Journalism." This is the conclusion of the presenter Manel Fuentes, who, defining the ingredients, emphasizes "good guests, humor, and current affairs", while, to be a valid presenter, he considers that "you have to be aligned, have content, and know how to channel it." He also underlines the characteristics of daily live broadcasting, as it allows one "to follow a story and tighten the screws."

The script director, Amando Cabrero, considered the formula for success to be due to great previous work. The editor, Camino Hontecillas, related this to the "magnificent professionals" in the artistic team, who "without good content, do not succeed." Along these lines, its director, Oriol Bosh, emphasized the importance of imagination to create what "we see on screen." Meanwhile, he noted that only 20% of program launches were successful and emphasized that, if he knew the formula for success, "he would be a multimillionaire." The deputy director of *Buenafuente*, Joan Grau, noted that the answer was the same as "always", believing that, for a program to work, three aspects must come together: "A clear concept that should be respected up to its ultimate consequences, the best team, and an adequate budget to carry it out." All this should be complemented with creative freedom so that "the network does not restrict its execution" and "a good leader." The production director, David Felani, also insists on the importance of decision-making.

"For Andreu, nothing is beyond the pale: live music, having the best comic actors, surprising the audience", he asserts while quoting the example of the live broadcasting of the destruction of *El Neng de Castefa*'s car in a crusher. He thus elevates the production beyond "a mere mechanism", instead making it a piece of great engagement, along with direction and production, without neglecting the question of "being inclusive with the public", thanks to a wide variety of collaborators, as a guarantee of success for the editor Marcos Mas.

This was a creative and technical evolution in the early stage of *Antena 3* that, for the director, David Guillén, "has been the greatest of *El Terrat* and Andreu", who emphasizes the ability of this professional to discover "outstanding" characters and "impressive" scriptwriters. This intertwines with *Sé lo que hicisteis*, whose scriptwriter Óscar Arenas highlights the "great chemistry" that arose on set through the ongoing television partnership between Ángel and Patricia. "This is not easy to find, and it was very important", emphasized its main manager, Juan Andrés García Ropero, and he extended this quality to the rest of the characters, providing another reason for the success of the freshness of the script, the videos, and the stability of the audience in "a very difficult format." This idea was shared by Samantha González on the basis of the large volume of work on the visuals, its immediacy, and the great demands emanating from production.

> "Under an analysis, a study of the technical elements that a program should have to work, there are very few; that is, mathematics does not work here (...) *SLQH* could not have worked if we had recorded 12 episodes at once, since it was live and you were with the contributors in real time". (Ángel Martín).

"The casting is vital and the tone is much more important than it may seem, but there were other ingredients: the chemistry, the script, the direction..." These are the essential points that, despite his statements, the presenter includes in the bonds of friendship that created the format and how this made a difference in terms of the familiar language that was not forced but "really existed." Similarly, for El Gran Wyoming, there are no elements of success: "If there was a formula, everyone would do it." He suggests that successful programs are a surprise, a mystery. "It is impossible to know before starting; nobody would have said that would last ten years, but it would not have lasted three months if it had not started at the same time as a network", he says about *El intermedio*. Thus, although he renounces planning, he connects his results with the support from the network.

Regarding structure, a valuable point for its presenter, Sandra Sabatés, is that they use humor to convey a message. She also reveals that it is "very complicated" to perform her twofold job: to mix rigor, objectivity, truth, and jokes in 50 minutes a day. At the same time, from the newsroom, Antonio Arráez suggests that the defining elements are his way of interpreting the information, which is "very pure", and the irony that, as determined by the head of script, Sergio Sarria, migrates from jokes to reflection. This involves working with news that expires quickly, as noted by the producer, Marian

García. Also, its director emphasizes its informative level, the talent of the scriptwriters, and the presenter, while its producer balances freedom of execution with its rapport with the general public.

Finally, the executive producer of *El hormiguero*, Jorge Salvador, distances himself from a formula per se, although he admits that there is a "trial and error process", after which, if it works, they move on. "You have to find a balance of ideas that works for a wide variety of people and ages", highlights this creator. To achieve this, as his script coordinator, Sergio González, continues, they never use the same structure. He also distances himself from a key to success and affirms that they face each broadcast as a very demanding challenge, "without rejoicing in past successes" although still aware that it is a "top" program that has been recorded in the *BBC* studios, according to its producer.
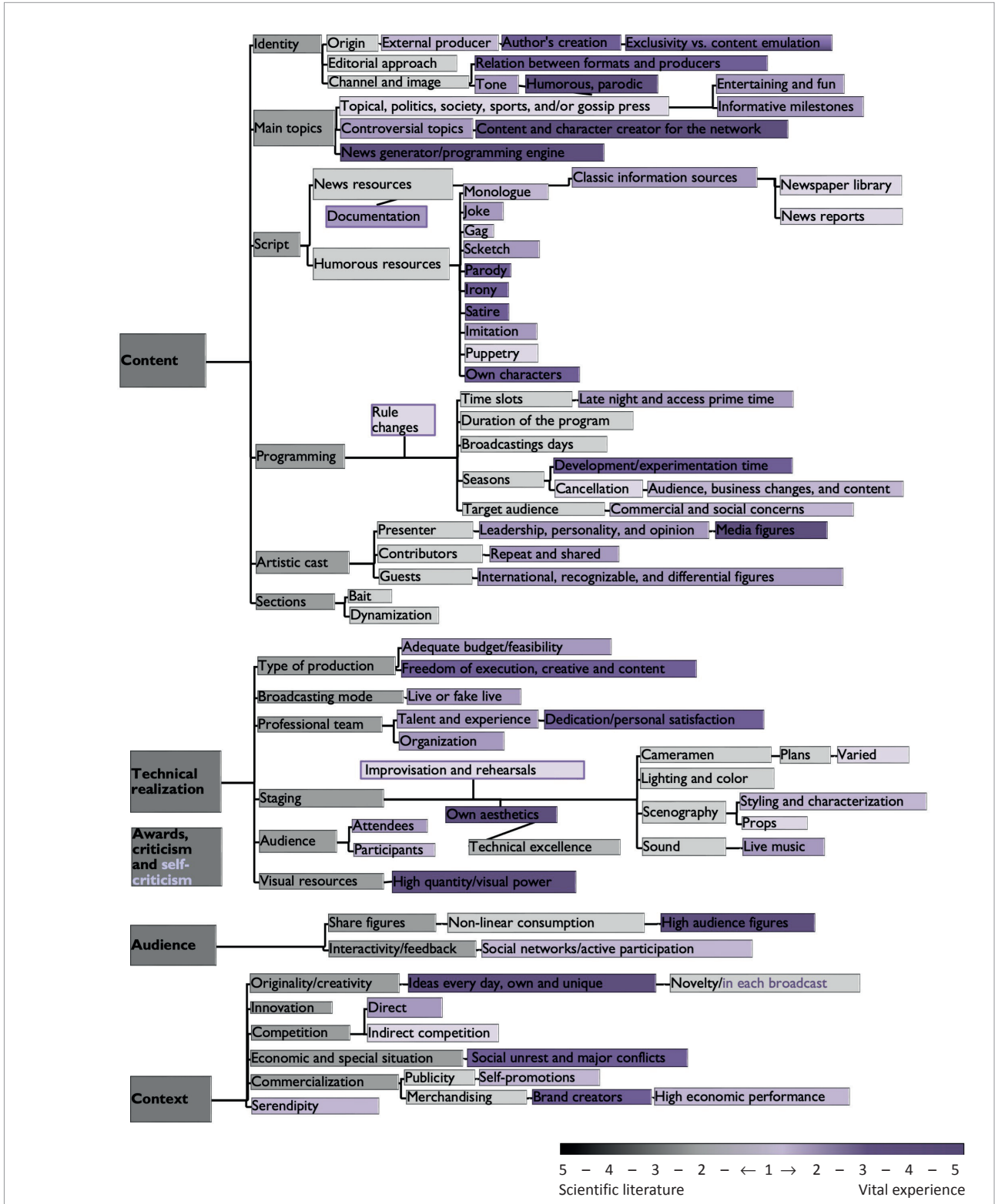
Figure 3. Decisive factors for measuring television success

On the basis of all these particularities, thanks to the correspondence between the categories of analysis and the interview questions, an analytical construction was created to combine academic components with the opinions resulting from the experience of television professionals, generating a set of ingredients that can be extrapolated. However, to generalize this to other situations, their specific characteristics must be considered.

This new, integrative proposal (Figure 3) makes it possible to measure television success in analytical studies and practical developments by means of a scale, according to its weighting. This systematizes the categories of analysis used in scientific literature with the unique factors that are behind products that achieve undisputed television success.

6. Conclusions

At a time of systemic crisis such as the present, the study of escapist content on television in terms of humor journalism, which is fundamental to the programmatic offering in television timetables, becomes especially relevant, as reflected in the various investigations carried out in recent years. However, no work combining the professionals' analysis with the state of affairs of all the success factors provided by the scientific literature had been carried out to enable the proposal of specific indicators.

Researchers have defined a structure for measuring success that continues to expand the experience of television humor professionals who, surprisingly, deny a formula for success, although they do point out the identifying components behind the success of seven journalistic humor formats.

The voices of those behind these programs provide additional value by proposing new aspects to the analysis of success, such as talent, the relationships between production companies, freedom of creation, and leadership. These parameters are not exclusive; rather, they are characteristics that define the formula for success as a main criterion, with differentiation being the reference characteristic that guides work on television.

Thanks to its practical transposition, the terms "failure" or "success" used by the teams was discovered to go beyond the quantitative or qualitative level, although they always start from a budget and audience figure that define the style and shape but do not solve the formula completely, because television and its formats are the creative and artistic result of a cultural industry.

6.1. Informative and original content of interest

Numerical values are not everything. Personal commitment, the defense of the creator, and the team's ideals are new developments in such analyses that previously only relied on the editorial line. Interesting, fresh, and original content is needed, since the public generally seeks surprise based on a clear concept that corresponds to a pioneering idea. This can be generated by an external production company at the request of a network, which must sustain the project for a reasonable time in which to test the content. Experimentation is, therefore, a maxim that is also added as a significant ingredient.

These programs learn from and adapt to the television language from the point of view of using humor as a counter-power. The irony and parodies address current societal issues and disparities at the international level, the gossip press, or sex, combined with controversial issues and newsworthy background. To this end, these platforms may or may not be structured in sections, as a discordant element that reflects the interest of the viewer, who becomes loyal to them as they can generate news. As the current experiences reveal, these programs are pioneers in establishing synergies with other products of the network. This is a strategy of proven success that is achieved through well-known guests who wish to attend these spaces relying on fame and fun.

6.2. Leadership and artistic excellence

Professionals in this field seek perfection based on their own performance and the professionalism that the interviewees achieve through the satisfaction of having worked on these successes. Thus, the teams condition success on the creative freedom that can bring freshness and achieve viability as a result of production ability. Successes in this area also do not neglect the quality obtained under the direction of experts in this typology that relies on a recurring cast that creates on-screen chemistry, with co-presenters intermingling with the figure of the presenter, the leader of the project whose personality positions them in current affairs, all the while seeking to relax the viewer.

The interviewees thus highlight their own use of a formula springing from an interrelation between humor that seeks to transcend the application of journalism through a strong script with wide-ranging subjects. This approach enables a technically effective television product thanks to continuous staging with a high volume of videos and graphics with music and preferably live broadcasting.

> A successful television script relies on five factors and a hundred categories, whose motto is to provide a different product for each broadcast. This depends on when and where it happens, and with the defining premise that humor needs originality to work

6.3. A decisive audience for new creations

This theoretical approach and the producers thus achieve desirable audience shares by constructing a strong business strategy to beat the competition. This strategy is supported by awards and reviews, as understood in this context, that is, acting as the protagonist of the content and reflecting the demands of a group of loyal viewers, to whom they provide a space for reflection and entertainment at the end of their day. Successes in this area can thereby create a debate with an audience that participates, attends, and grows with the format itself.

This is a favorable result whereby television must experiment and reinvent itself based on proven formulas, while the triumphs correspond to the search for the best program possible. Thanks to the current research, this can be formulated under already proven keys that can be applied to reduce the risks of an audiovisual business. Meanwhile, the future will require a firm commitment from the protagonists of humor journalism, where intelligent laughter will emerge as a driver of television excellence.

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8. Annexes

Annex I. List of humor journalism formats broadcast for more than one and up to four years from 1990 to 2015

Pero... ¿esto qué es?	La 1	1989-1991
Tutti frutti	Telecinco	1990-1992
Este país necesita un repaso	Telecinco	1993-1995
Esta noche cruzamos el Mississippi	Telecinco	1995-1997
La parodia nacional	Antena 3	1996-1999
El informal	Telecinco	1998-2002
Cruz y Raya.com	La 1	2000-2004
Pecado original	Telecinco	2002-2005
CYR. Juan y José show	La 1	2004-2007
Noche Hache	Cuatro	2005-2008
Agitación + Iva	Telecinco	2005-2007
Unidad de visionado especial	Cuatro	2006-2007
Muchachada nuí	La 2	2007-2010
Estas no son las noticias	Cuatro	2008-2009
La hora de José Mota	La 1	2009-2012
Tonterías las justas	Cuatro	2010-2011
Torres y Reyes	La 2	2013
Alaska y Coronas	La 2	2014
Alaska y Segura	La 1	2015
En el aire	La Sexta	2013-2015
Salvados*	La Sexta	2008-
Zapeando**	La Sexta	2013-

 * Omitted from the analysis due to its change in reporting format
**Omitted from the analysis for not completing five years before the 2015-time frame

Annex II. Broadcasts viewed for the analysis

Caiga quien caiga	Crónicas marcianas	Buenafuente
05/10/1996 - *Telecinco* premiere 06/29/1997 - Last season 09/14/1997 - First season 09/13/1998 - First season 06/18/2000 - Audience 26.4% 10/01/2000 - First season 09/23/2001 - First season 12/22/2002 - Last broadcast 01/28/2005 - Second adaptation premiere 09/23/2005 - First season 10/06/2006 - First season 01/30/2008 - Last broadcast 07/16/2008 - Last season on *La Sexta* 12/22/2008 - Last broadcast 07/25/2010 - Last broadcast on *Cuatro*	09/08/1997 - Premiere 09/07/1998 - First season 09/06/1999 - First season 09/25/2000 - First season 09/17/2001 - First season 09/16/2002 - First season 03/30/2004 - Audience 40.1% 07/21/2005 - Last broadcast	01/11/2005 - Premiere on *Antena 3* 10/26/2005 - Availability 06/28/2007 - Last broadcast 09/17/2007 - Premiere on *La Sexta* 20/11/2008 - Availability 22/04/2010 - Availability 01/19/2011 - Availability
	La noche con Fuentes y Cía	**Sé lo que hicisteis**
	09/30/2001 - Premiere 03/30/2003 - Audience 32.3% 05/30/2004 - Availability 10/12/2004 - First season 04/03/2005 - First season 08/21/2005 - First season	03/30/2006 - Premiere 04/11/2007 - First season 10/05/2007 – 100th episode 10/16/2008 - Audience 08/31/2009 - First season 05/20/2011 - Last broadcast

El intermedio	El hormiguero
03/30/2006 - Premiere 11/27/2006 – 500th episode 01/21/2008 - Audience 6.7% 09/08/2008 - First season 09/21/2009 - First season 09/01/2010 - First season 08/29/2011 - First season 03/12/2012 – 1,000th episode 06/26/2014 - Last season 05/26/2015 - Audience 17.6% 09/07/2015 - First season	09/24/2006 - Premiere on *Cuatro* 05/29/2008 - Last season 04/25/2009 - Audience 16.2% 02/24/2010 – 500th episode 08/26/2010 - First season 06/04/2012 - Audience 16.3% 01/23/2013 - Audience12.5% 12/19/2013 - Audience 16.1%, 09/01/2014 - First season 10/16/2015 - Audience 20.4%

Generation Z in Chile, Colombia, México, and Panama: Interests and new digital consumption habits. Their use of *Instagram* and *TikTok*

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Abstract

In a reality that combines the virtual with the physical and in a context of information saturation, there are consumers who are more critical, demanding, and less loyal. In this context, it is timely to know the new habits of the Centennials, so as to understand their behaviors and consumption trends, aligning future communication strategies to their personality and interests. The Centennials or Generation Z are digital natives, concerned with technology, and complex to understand (Alonso-López; Terol-Bolinches, 2020). Generation Z –analyzed in this study– is composed of those born between 2000 and 2008, which corresponds to the youth currently between 14 and 22 years old (Vilanova; Ortega, 2017; Hernández; Andrade-del-Cid, 2020). The main objective of this research is to determine the patterns of consumption and online behavior exhibited by this generation in Mexico, Colombia, Chile, and Panama, with a focus on the characteristics of communication processes, online consumption patterns, and the cultural traits they possess. To achieve this, a mixed method is proposed consisting of a *Twitter* conversation analysis, survey application (n=550), in-depth interviews (n=36), and focus groups (n=2); all of which have been applied in the four selected countries. The main conclusions are that the preferred content of Centennials is humor (75%), with *Instagram* and *TikTok* being the most used networks. For they, the most important thing is to take care of their image and 40% are not interested in technological topics. Furthermore, cultural characteristics are shared among countries; however, language is the main difference between countries.

Keywords

Instagram; Gen Z; Generation Z; Centennials; Online behavior; Latin America; Conversation trends; Consumption patterns; Virtuality; Culture; Advertising.

1. Introduction

The social phenomenon caused by different generations has been the subject of study for decades in different disciplines. For this research, we have chosen to analyze Generation Z or Centennials (throughout the text we use both denominations interchangeably) due to its prominence in recent years. Different industries are constantly searching for data on the behavior and consumption patterns of Centennials, which are functional when designing strategies and campaigns to inform or communicate products and services (**Goldring**; **Azab**, 2021). Unlike other generations, Z's

> "do not know a world without the Internet, who are constantly accompanied by their smartphone and use social networks as their main communication tool, mainly *Instagram*" (**Alonso-López**; **Terol-Bolinches**, 2020, p. 2).

One of the most important characteristics of this generation is that they are digital natives, which results in a life both inside and outside of the network. This fact has a significant impact on how they communicate, the type of content they consume, and their interaction with the environment (**Turner**, 2015). It is worth mentioning that 88.4% of Centennials in the LATAM region have access to the Internet and actively use digital media (*Panamerican Health Organization*, 2021). Currently, these teenagers and young people represent 22% of the population of Latin America, and this figure is expected to remain until 2030 with a variation of 1%, according to data from the *Panamerican Health Organization* (2021).

When talking about Centennials, some authors point out that "there is no definite consensus on the start and end dates for naming younger generations" (**Marinas**, 2019; **Francisco-Lens**; **Rodríguez-Vázquez**, 2020), and that also applies to Generation Z. In fact, some authors consider this generation to be individuals born between 1994 and 2010 (**Taylor**; **Keeter**, 2010; **Priporas**; **Stylos**; **Kamenidou**, 2020), while others limit it from 2000 to 2007 (**Martín-Ramallal**; **Micaletto-Belda**, 2021). Given the disparity of years for this cohort, and with the purpose of equalizing criteria, for this particular research, young people born between 2000 and 2008 (14 to 22 years old) are considered, an age range similar to that used by **García-Rivero**, **Martínez-Estrella** and **Bonales-Daimiel** (2022) in their research on Generation Z in Spain.

In Generation Z, it is important to note that the concept of adolescence is changing, as according to **Gualtero** and **Soriano** (2013), adolescence is a period that is defined by both biological and social criteria: the transition from childhood to independence from parents. They add that especially in Western countries, the change from adolescence to youth is becoming increasingly delayed. Therefore, it is difficult to consider these young people as mature adults.

Therefore, the article aims to determine the consumption patterns and online behavior of Generation Z in Mexico, Colombia, Chile, and Panama, emphasizing their communication on social networks, topics of conversation, and their relationship with advertising. To obtain more detailed information about Centennials, the classification proposed by **Mascó** (2012) is used, which divides Generation Z into two age ranges: Z1 (14 to 17 years) and Z2 (18 to 22 years). This categorization is important when creating discussion groups and the survey, as well as highlighting the most significant information about these age groups in the discussion and conclusions.

Consequently, the elements necessary to achieve assertive communication towards this target audience are established, which can be useful for various sectors such as entertainment, advertising, sports, fashion, and even politics. As a secondary objective, the cultural characteristics of Centennials by country are also determined, and it is pointed out if there are significant differences between sexes; this with the intention of being able to describe in detail the Centennials of the selected countries and so that the found particularities can be taken into account in future works.

The research is developed through a mixed method –which considers the analysis of *Twitter* conversations, interviews, focus groups, and the application of an online survey. The perceptions and opinions of the Centennials themselves are prioritized in the data collection. The countries selected to carry out the study are Mexico, Colombia, Panama, and Chile. This selection is based on their Spanish-speaking populations, their population size of young people, their purchasing power, and the representative advertising investment that brands make in each country.

Although Generation Z shares several characteristics among countries, there is a cultural, social, and economic context that influences behavior and purchase decisions; that is why, if one intends to study Centennials in LATAM, it is important to emphasize that the purchasing power and the value of the currency in Latin America is "significantly lower than the dollar" (*Statista*, 2022), with Mexico, Chile, and Panama being the countries with the highest purchasing power in the region. According to the *International Monetary Fund* (2021), Panama and Chile have a purchasing power per capita of between $36,085 US and $28,526 US, similar to those of residents of Ireland and Singapore, which means that some countries in the region have exponential growth that contributes to purchasing decisions and modifies the communication forms of this generation.

In addition, it should be noted that during 2021

> "total spending on advertising in Latin America amounted to 27,900 million US dollars, expecting growth above 30,000 million for 2023" (*Statista*, 2022).

This investment in commercial communication is mostly made in Mexico and Colombia, countries that are included in the study sample. For these reasons –language, population, purchasing power, and investment in commercial communication– Panama, Chile, Mexico, and Colombia have been chosen for the study.

Undoubtedly, Generation Z has become the focus of attention for different industries, such as communication and entertainment, because in the mid-term, these young people will have an incursion into the workforce, a situation that makes them the next potential consumers and demands strengthening the relationship between the user and companies.

1.1. Centennials profile in Latin America

Vilanova and **Ortega** (2017) define this generation by the rule of the "four i's": irreverence, immediacy, inclusion, and uncertainty (*incertidumbre*). This is due to

- feeling free to have thoughts different from other generations;
- access to the Internet to get what they want when they want it;
- collective and collaborative work, as well as a change in mindset regarding social rights; and
- the constant change that characterizes the current world and the instability that accompanies it.

Linked to the first and third characteristics, irreverence and inclusion, Madrigal-Moreno, Madrigal-Moreno & Béjar-Tinoco point out that

> "in addition to having a more open thought than other generations, they know in which situations to say no and in which ones to raise their voice in defense of their rights" (**Madrigal-Moreno**; **Madrigal-Moreno**; **Béjar-Tinoco** 2021, p. 271).

Regarding the second characteristic and, therefore, access to the Internet, it is important to note that the technology available to "Z" youths has also altered their relationships with their close environments (**Gómez-de-Travesedo-Rojas**; **Gil-Ramírez**, 2020), specifically the use of the mobile phone

> "mainly marks their behavior, their presence in the world, and, especially, the way in which they communicate with each other and with others" (**Hernández**; **Andrade-del-Cid**, 2020, p. 5).

The Centennials are "children of technology, of virtual learning" (**Vilanova**; **Ortega**, 2017, p. 1), so their relationship with technology has changed the consumption of content and, consequently, has caused "a change of paradigm in the communicative ecosystem" (**López-Vidales**; **Gómez-Rubio**, 2021, p. 550). Finally, with regard to the fourth characteristic: uncertainty, it should be noted that this age group was born and grew up during a time of crisis, a situation that causes social transformations (*Unesco*, 2021), influencing their behavior.

According to the report by the *Youth Observatory in Ibero-America* (2021), 92% of Latin American youth access the Internet daily. In countries such as Mexico, the Z generation invests 5.7 hours on average per day; in Chile it's 4.7 hours, 3 hours in Panama, and 4.3 hours in Colombia. The mobile phone is the most used device throughout the region, and in order of preference, access to social networks is the most popular use of the Internet (65%), followed by instant messaging (49%). These frequency of use data coincide with the study by **Giraldo-Luque** and **Fernández-Rovira** (2020), who confirm that young people spend more than 4 hours a day browsing the Internet, concluding that they are immersed in a hyper-connected universe.

All of this is reflected in a change in media consumption, among other things. The immediacy that characterizes them, combined with the technological boom, has caused young people to gradually abandon traditional media and migrate to digital platforms and on-demand videos (**Navarro-Robles**; **Vázquez-Barrio**, 2020; **Marcos-Ramos** *et al.*, 2020; **Gutiérrez**; **Cuartero**, 2020). Figure 1 illustrates this change in media consumption, showing the preference for communication media among young Latin Americans in recent years.

Generation Z, unlike Millennials, grew up during the Great Economic Recession period; according to **Panocillo** (2019), this made these young people more pragmatic and seeking opportunities that bring stability. It is important to note that Generation Z has
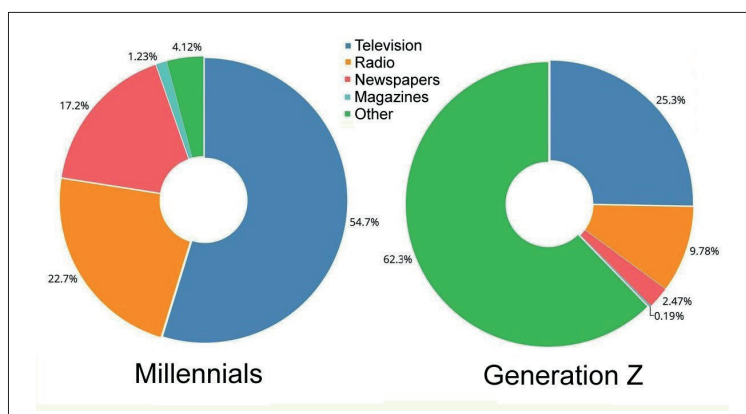
Figure 1. Comparison of preferred media: Millennials *vs.* Generation Z
Source: **López-Vidales** y **Gómez-Rubio** (2021).

come of age during a time characterized by crisis and, as a result, increased inequality and job insecurity, as well as the rise of social media in the technological sphere (**Robinson**; **Schänzel**, 2019).

In terms of brand communication, the figure of the influencer emerges, a characteristic aspect of this generation since, as noted, they are the "media referents of these young people" (**Elexpuru** *et al.*, 2021, p. 20). With influencers, a new advertising format emerges: product prescription; as a result,

> "youth face an increasingly hybrid scenario in the context of social networks" (**Feijoo**; **López-Martínez**; **Núñez-Gómez**, 2022, p. 8).

In this sense, the research by **Djafarova** and **Bowes** (2021) argues that microcelebrities continue to be the main influence on the fashion impulse purchases of Generation Z women, because they set their trends. In the same way, these authors state that Generation Z is the one that makes the most impulse purchases (41%), followed by Millennials with 34% and Generation X with 32%. This fact is related to the transformation of social relationships in which Generation Z is immersed.

In the specific case of Latin America, there has been a growth of these figures; for example, Mexico is the third country in Latin America with the most influencers, with approximately 443,000 nano and microinfluencers; Colombia follows with around 408,000 and Chile with approximately 386,000 (*Influencity*, 2020).

Regarding the consumption of products and services by this generation, there are international studies in Latin America, such as the one by **Ortega-Vivanco** *et al.* (2021), which analyzes the effects of the COVID-19 pandemic on the buying behavior of these young people in Ecuador, Mexico, and Colombia. The authors assure that this generation "the delivery to the home and the virtual store during the crisis have reversed the flow of purchase and consumption of experiences, goods, and services" (p. 6), increasing significantly. Thus, these data demonstrate that we are facing a generation that, in addition to having its own particularities due to the context in which it was born and raised, seeks customization in the communication and content it receives; as well as not separating from virtuality. Both situations have a significant impact on their behavior and choices.

On the other hand, by considering four countries for the sample, the cultural and social aspects that each population may have are taken into account. Talking about cultural characteristics refers to a minimum frame of meaningful traits that can help recognize a culture. This includes language, religion, language, nationalism, history, legal system, arts, customs, moral principles, among other elements that define human behavior (*Cepal*, 1981; **Gomáriz**, 1996). Furthermore, information about the heterogeneity of a population is useful in designing integration policies and improving communication with citizens.

The cultural aspects of a country have significant effects on the values and attitudes of individuals (**Robbins**; **Decenzo**; **Coulter**, 2004). One of the variables within cultural characteristics is gender, because it influences the cultural identity of the population. Thanks to this, an individual can know themselves as unique and at the same time, belong to a group (**Rocha-Sánchez**, 2009).

It is also important to note that there have already been some authors who have analyzed young people from Colombia and Spain, comparing them with each other; this is the case of Almansa-Martínez, Almansa-Martínez, Fonseca and Castillo-Esparcia, who argue that

> "young people have the need to show themselves in an original way, with their own language. Boys and girls compete to post striking photos for their peers: posed, suggestive gesture photos, retouched images, montages" (**Almansa-Martínez**; **Fonseca**; **Castillo-Esparcia**, 2013, p. 133).

For the research, language is considered one of the main variables within cultural characteristics.

2. Methodological development

To carry out this research, a mixed method was applied using qualitative and quantitative techniques. The quantitative approach, applied in this case to the listening of social networks and surveys,

> "uses data collection to know exactly the behavior of the study population" (**Hernández-Sampieri**; **Fernández-Collado**; **Baptista-Lucio**, 2006, p. 45).

On the other hand, the qualitative vision performs an interpretive work between theoretical concepts and data (**Blumer**, 1982), which involves exploring a reality that, in this study, consists of online behaviors and consumption patterns of generation Z in Latin America. To obtain this qualitative information, in-depth interviews and focus groups were conducted with both young people and their parents and experts.

Then, for the quantitative variables, the first step was to monitor conversation trends on *Twitter*. The data extraction was carried out from March to May 2022 through the specialized applications *NodeXL* and *Talkwalker*. Thanks to the functionality of these platforms, the data could be separated by geographical location to have the data divided among four selected countries (Mexico, Colombia, Panama, and Chile), as well as by generational gap and gender. In total, 17 databases were obtained, totaling 40,545 tweets.

The reason why *Twitter* was selected as the social network to analyze is because this microblogging platform facilitates the analysis of information diffusion patterns (**Bakshy** *et al.*, 2011) among users. In addition, there are precedents of observing conversation trends as presented in the research of **Pérez-Dasilva**, **Santos-Diez** and **Meso-Ayerdi** (2018) and **Del-Fresno, Daly** and **Sánchez-Cabezudo** (2016). **Ahmed** and **Lugovic** (2019), on the other hand, point out that data extraction can map the conversation by marking the topics that generate the greatest interest and reactions among Centennials in the selected countries.

This data collection determined the scope of the conversation points that were monitored, as well as the acceptance of certain content formats among the study population. With the *Twitter* databases obtained in each country, it was possible to divide the interests by generational gap, as well as to discard the temporal reactions; that is, conversations about specific issues about current events, which are usually transient and cannot be considered a priority topic for Centennials, there is no "fixation of the topic" (**Mancera**; **Pano**, 2013, p. 236).

Simultaneously, two focus groups were held with Centennials aged 14 to 22. Based on the affirmations of **Meigniez** (1971), group dialogue helps to accept or reject the phenomena that occur during the discussion and stimulates awareness, which links together the perceptions of the participants. The goal of the focus groups was therefore for young people to verbalize their ideas, perceptions, and feelings they considered about the proposed topics and thus understand the attitudes of this generation. The groups consisted of eight men and eight women, with an equal presence from each country. It is worth mentioning that the classification of **Mascó** (2012) was taken into account when preparing these discussion groups, and therefore, in one of them there were Centennials with a lower educational level, and in the other, those with a higher educational level.

Additionally, the young people who participated in the focus groups shared the content they publish on their *Instagram* and *TikTok* accounts, allowing for an evaluation of the type of posts they regularly make. The review of that content considered three variables: a) intention, b) tone, and c) aesthetics.

Due to the monitoring on *Twitter* and the application of focus groups, the most relevant sectors in the daily life of Centennials were identified: sports, entertainment, fashion, and music. Following this, 36 experts and professionals from different areas were contacted, such as education [university, high school and institute directors and teachers], social studies, psychology [counselors and therapists], social work, advertisers, influencers, and parents. Table 1 presents the information related to the interviews.

Table 1. Interviewee form

Country	Colombia	Chile	México	Panamá
University professor	2	2	2	2
High school teacher	1	2	2	2
Psychologist	1	1	1	2
Social studies	2			2
Publicist/comunicator		1	1	
Influencer	2		2	
Parents	1	2	2	1
Total	9	8	10	9

Subsequently, the interview information was processed in Atlas.it in order to find matches (**Penalva-Verdú** *et al.*, 2015) and thus confront the knowledge of the experts and parents with the perception that young people have of themselves, obtaining inputs that young Zs do not always reveal in a face-to-face conversation.

With the information gathered from the analysis of social networks, the interviews and the focus groups, the statements to be validated by a larger population group were structured. In this sense, an online survey was disseminated in the selected countries with the intention of validating the first data obtained with the previously applied techniques and also to identify new data of interest that could be broken down by country in order to identify the particularities of each geographical area.

To maintain the accuracy of the study, the estimation of the proportion in the sample was based on the current population of young people between 14 and 22 years of age in each country, considering the 2020 population censuses. A margin of error of 10% was respected, with a level of confidence of 90%. Therefore, the following percentages were met: Mexico (16%); Colombia (25.9%); Chile (13.9%) and Panama (16.8%). Based on these figures, the size of the sample required to validate the survey results was established.

Therefore, the online survey included a non-probabilistic random sample of men and women between 14 and 22 years of age. All of them are young students from high school or institute or university and belong to a medium, medium-high and high socioeconomic sector. The link was disseminated through the experts who participated and also in different educational entities of the levels mentioned. A total of 550 responses were obtained [Mexico n=235; Colombia n=130; Chile n=105 and Panama n=80]. 46% were men and 54% women. The average age of the sample was 18.8 years.

The questionnaire followed a thematic model, where questions were asked about the use of technology and consumption on social networks, as well as interests, such as hobbies and lifestyle. Some questions were open-ended, others were multiple-choice and the rest corresponded to a Likert scale that helps measure the validity of the proposed items

(**Blanco**; **Alvarado**, 2005). Thus, the degree of preference these young people have was found with regards to their tastes, preferences, life choices, and beliefs, such as the case of acceptance towards the LGTBIQ+ community.

To summarize, two focus groups were conducted with Centennials, 36 interviews with experts, and 550 surveys, as well as monitoring on social networks. With this information, the main conclusions were obtained which help establish guidelines for designing a communication strategy aimed at Centennials, determining consumption patterns, communication methods, and determining the most significant cultural characteristics of these young people by country.

It should be noted that the application of online methodologies such as surveys or focus groups is increasingly common in research and is supported by various authors (**De-Marchis**, 2012). In fact, one of the reasons why the internet has been used as an access channel is due to the

> "possibility of reaching population segments that are difficult to locate through personal and telephone surveys" (**Arroyo-Menéndez**; **Finkel-Morgenstern**, 2019, p. 52),

an important point considering the geographical breadth outlined in the work.

3. Results

Below, the most notable results of each of the research phases are described to facilitate reading and highlight findings, the division between Z1 (14-17 years old) and Z2 (18-22 years old) is applied. Of the 550 responses collected in the survey, the Z1 group has 220 participants and 230 belong to the Z2 group.

3.1. *Twitter* conversation tracking

The conversation topics observed coincided with the daily trends marked by *Google Trends*, therefore it could be ensured that they were the topics with the most audience and interaction during the months of monitoring (from March to May 2022). Once the data was filtered and sorted, the main interests of conversation that Centennials have could be determined. Firstly, it was found that the strongest node [representation of the number of users] in the four countries is football, coinciding with the temporality of the *2021-22 Champions League* matches, and representing 80% of the conversation among men between 17 and 22 years old.

The next largest node is music, where the age range covers from 16 to 22 years old. Centennials tweet about their favorite artists and bands. Z1 prefer reggaeton; while Z2 listen to more rock and pop. The third topic of interest is politics; particularly in Chile, people tweet about their disagreement with the government; followed by Mexico, where security and drug trafficking issues are associated with political matters. In the digital conversation about these topics, it was detected that 25% of participation corresponds to young people between 20 and 22 years old, which refers to a youth interested in the future of their country.
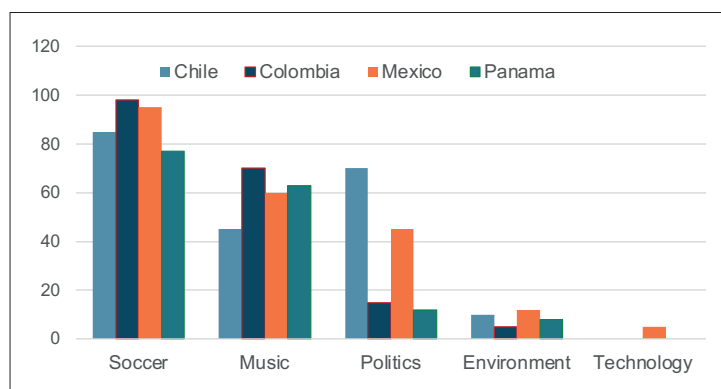
Figure 2. Conversation trends

In general, it is observed that one of the least talked about topics are those related to the environment and social causes, and it was also not found that technology is a trend in conversation for young people.

A peculiar observation in Panama is the interest in Turkish and Korean soap operas; 18% of the posts made about these television programs correspond to men and women between 18 and 22 years old (group Z2).

Similarly, the following of these topics coincides with what was discussed in the focus groups applied to Centennials, especially because they show no interest in the technology sector, such as online games, cryptocurrencies, or the metaverse.

Another finding that stands out, although not considered a trend, is the religious participation of these regions. Given that the observation on the network coincided with the celebration period of *Holy Week*, according to *TalkWalker*, 28% of the posts on this topic in Panama and 20% in Mexico corresponded to young people between 17 and 22 years old. When asked about their beliefs, 95% of the surveyed young people claim to believe in a deity –Catholic or Christian– and only 3.6% declare themselves as atheist. The rest believe in the power of nature and the energies of the cosmos.

3.2. Z Generation's online behavior and consumption

The focus groups showed that Centennials cannot conceive of a reality without technology or the Internet: they have the need to be connected 24 hours.

> "I check everything on my phone, I really prefer to learn things with tutorials, because it's faster" (man, 16 years old, Panama).

The Zs from the four countries share informative and usability interests on social media; highlighting that they maintain *Facebook* accounts to be observers, because they do not post on that platform. Z2 is the group with the greatest presence on this social network. Furthermore, Centennials from the four countries do not continuously post information on their profiles and protect their privacy, which coincides with the survey responses, where more than 78% of the sample indicated that they have a passive and observer role on social networks. Moreover, Z1 confirms that for security reasons, they only make friends in person, at school or institute.

> "They always tell you that talking to strangers on networks is dangerous. You hear it in school, in the media, and at home. So we have it very internalized" (man, 14 years old, Mexico).
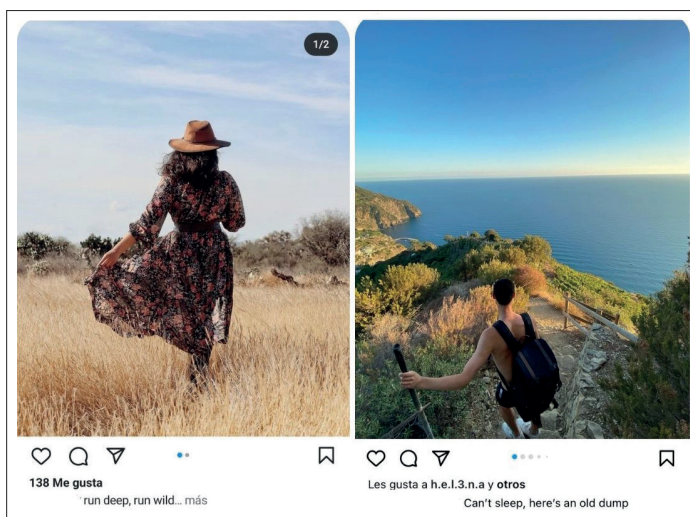
Figure 3. Zs' *Instagram* posts.
Source: *Instagram*, 2022.

Then, the content review that was carried out of the profiles on *Instagram* and *TikTok* of the focus group participants showed that aesthetics is the most important variable for Centennials. In general, on *Instagram*, they choose a minimalist style that revolves around sober and dark colors such as black, white, gray, and reddish; they avoid posing with their face in the foreground, thereby reinforcing the care they have with their privacy.

In Mexico, Chile, and Colombia, young people dress in an aesthetic style, limiting the use of bright-colored clothing, while in Panama, Centennials prefer a style inspired by hip-hop. The purpose of *Instagram* posts is mostly to showcase the places they visit and the hobbies they have. It is interpreted that they like to show their activities, primarily Mexican Zs sharing the places they are at, such as restaurants or while traveling. They also prefer to use the story option instead of making fixed posts on their profile.

> "Social networks are like my resume to the world, I only post what I want others to see of me and my profiles are private" (man, 22, Colombia).

Regarding *TikTok*, Zs' videos are humorous, for example, they perform dances that are trending on this network. However, it must be noted that profiles on this platform are private.

> "I like to dance with my friends and upload them to laugh, but they are not public" (woman, 17, Mexico).

Another aspect related to Zs' behavior is their openness to diversity and inclusion, specifically with the LGTBIQ+ community, 44.5% of the sample showed indifference towards the topic, had no opinion and did not mention that they will take any particular action to support acceptance and/or inclusion of this population group.

> "Everyone says they are allies but when it comes to their interests or when they are behind closed doors, they are judged" (woman, 20, Mexico).

It is noteworthy that in general, men have greater acceptance of this community. Although Panama and Chile are the countries with the least openness towards homosexuality, transgender issues, etc.

> "In Panama, it is very far-fetched that they can express their gender change, that men can dress as women and vice versa" (mother, Panama).

> "These archaic ideas are being broken and someone from the LGTBIQ+ community is seen as brave" (man, 20, Chile).

When speaking of their online behavior and consumption, Centennials clearly differentiate between immediate communication and seeking entertaining content. 98% of the sample assured that *WhatsApp* is the social network they use to communicate, while for entertainment, they use *Instagram* (47%), followed by *TikTok* (30%) and *YouTube* (27%). *Twitch* is the platform used the least by young people, as 98% place this network in last place of use/preference. It must be noted that in Chile, Colombia, and Panama, *Instagram* is used more for recreational purposes, while in Mexico, the most used network is *YouTube*.

The most consumed content on social networks are humorous and comedy videos (75%). This is followed by videos that present scientific or curious facts (12%), in this type of content, it is common for creators to use the traditional "did you know?" formula. In third place (10%), beauty and exercise routines are positioned. This emphasizes the importance that young people place on taking care of their image.

> "I like to exercise because basically I'm working on my body" (man, 22, Colombia).

It should be noted that it is the Z2 who have the greatest concern for body care, they are even careful with their diet, as this study found that in the Z2 from the four countries, fast food consumption is lower and there are more young people who claim to be vegetarians.

Lastly, suspense and horror series rank last in preference (3%). These choices are homogeneous among men and women, as well as among countries. Although, it can be noted that Z2 are the ones who, slightly, consume more videos about science and curious facts on *TikTok*.

67% of Centennials say that they follow an influencer on social networks, confirming that they feel linked to these figures in some way; for example, they may feel admiration for them, follow them because they provide them with useful information for their day to day, or because they feel identified with the interests that the influencer shares in their networks.

Table 2. Do you follow any influencer? Observed value

	Men	Women	Total
Yes	154	202	356
No	99	95	194
Total	253	297	550

Table 3. Do you follow any influencer? Chi²

	Men	Women
Yes	0.50	0.49
No	1.07	0.89
Chi²	1.57	1.38

Within this type, figures such as athletes and actors weigh more than influencers as such. These public figures have a great media presence, as they dominate the scene in all countries: Luisito Comunica, AuronPlay, Ibai, Kimberly Loaiza, Messi, Cristiano Ronaldo, Robert Downey Jr, and Johnny Deep. It can be mentioned that recognition and engagement towards these characters is equal in all countries.

To determine whether following an influencer depends on the sex of young people, the chi-squared statistic was applied based on the percentage of responses from men and women.

A chi-square statistic of 2.95 was obtained with a p-value of 0.566 and maintaining a degree of freedom of 4. Therefore, as p is greater than 0.5, there is no dependence between variables, so it is only random differences. It can therefore be determined that following or not following an influencer on social media does not depend on the user's gender.

3.3. Experts describe the Z profile

Thanks to the interviews, it was possible to contrast what young people think with how they are perceived by experts. Figure 4 shows the main cores that are the subject of study in this research: communication, online behavior and advertising.

First, there is a direct relationship between communication and online behavior, as young people make excessive use of social media, through which they create their own language, which sometimes is even difficult for adults to understand. The constant flow of information triggers an overflow of impulses, which leads to the low attention and retention that Centennials have, both in entertainment and in the educational field.

"They are exposed to a lot of information and stimuli, so they have to do a much more intense work of integration, negotiation, and agreement than other generations" (psychologist, Mexico).
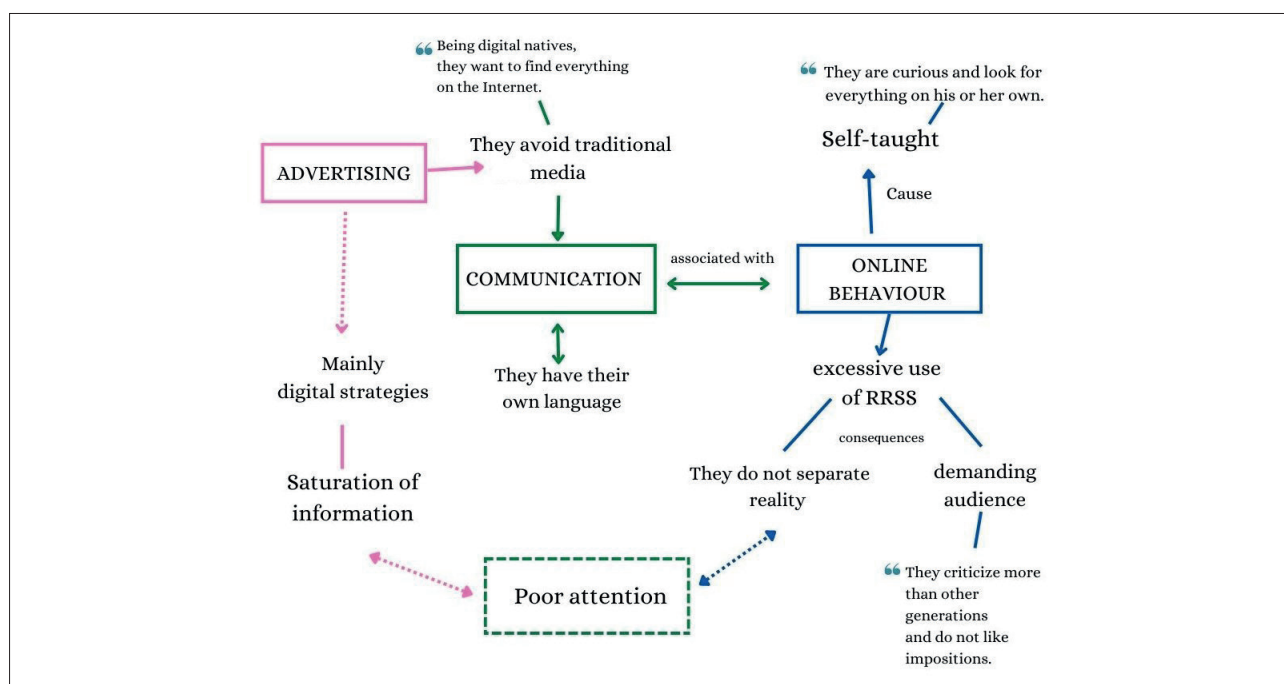
Figure 4. The Z profile according to the experts

Similarly, it's striking that professionals emphasize that many young people treat virtuality as another reality.

> "Being so digitalized, they live a lot in superficiality, so what do they value? Being seen and appreciated for who they are and how they are" (high school teacher, Chile).

' The constant flow of information triggers an overflow of impulses, which leads to the low attention and retention that Centennials have, both in entertainment and in the educational field '

In addition, the interviewees agree that the main characteristics of Centennials when communicating and using social media are:

- use of short messages;
- they like to read little;
- they use their own language;
- they use emojis and stickers to replace words and expressions;
- they have parallel conversations on various platforms.

Another finding related to their online behavior is the privacy they maintain when using social media. This situation is contrasted with the observations of experts, in relation to what Centennials think, as they do not consider themselves exhibitionists and do not constantly publish content.

> "They publish everything, they need constant validation from their social circle" (high school teacher, Mexico).

Table 4. Contrasts the statements of each party

Experts	Centennials
Like to be the center of attention	Privacy matters
May be exhibitionists	I don't like to upload pictures of myself
They talk to people they don't know	My circle in social networks is closed: only friends or acquaintances
Like to have an opinion on everything	I inform myself about current issues in order to be able to give my opinion

Likewise, experts agree that they are a generation with a more developed critical thinking and willing to question when there is an abuse of power.

> "The student does not accept authority simply because it is authority; it can be questioned, counter-questioned and disagreed with" (university professor, Colombia).

On the other hand, the interviewees agree that Centennials have the desire to always be informed and know other truths. For this reason, it is emphasized that the majority are self-taught; their main source of information is the Internet, considering *Twitter* and *Instagram* as means of following news that interests them.

Additionally, in their behavior, the internalized idea of living in constant comparison is highlighted.

> "They feel much fear of being left behind, they feel fear of failure, because as they are involved in this world, where everyone posts what they do, where they go, what they have; then, they always feel that need; they compare themselves or believe they are compared to others" (high school teacher, Panama).

Another important aspect that experts point out is that young people have a different notion of time than other generations. For them, time passes faster and the novel quickly loses that quality. When referring to "retro" issues, it is just 5-6 years old. In this sense,

> "that dimension of time raises fleeting relationships with everything else" (university professor , Colombia).

Finally, experts add that, to capture the attention of Centennials, the brand should not show itself as superior, but as equal and not have complex storytellings. The challenge is to surprise the young audience without falling into falsehood.

> "The most important thing is to seek to make a match" (communication and brand positioning consultant, Chile).

Thus, the elements that best score Centennials in advertising are originality, brief messages, and narratives that resemble their reality.

3.4. Advertising according to the Z Generation

The characteristics found in this demofigureic indicate that 72% want ads that provide useful information about the product and/or service being promoted, compared to 62% who are only interested in ads that relate to their tastes. 27% prefer advertising to be very colorful, while 24% opt for advertising products that have special effects. These perceptions are equal among countries and between the sexes. However, Z1 prioritizes advertising that provides them with functional information.

> "I prefer a brief advertisement with a clear message that gives me something" (man, 15 years old, Chile).

It is worth noting that 95% of Centennials think that the daily ads they see on their social media profiles do not impact them or influence them to want to buy a certain product.

Despite these young people being digital natives and averaging four hours online per day, they do not have a fondness for online shopping or playing online. This situation may also be due to their age and the low or no income they have.

> "I don't like shopping online; I like the experience of going to the stores and trying on what I want" (woman, 22 years old, Mexico).

In fact, those who claim to make any online purchases do so on *Amazon*, and most of these are young people between the ages of 20 and 22, that is, the "older" Centennials. In the case of minors, the purchase process is supervised by their parents.

The buying criteria of this generation is to buy products because they are "in fashion" or because "everyone uses them". *Nike* (27%), *Apple* (13%), *Zara* (12%) and *Samsung* (12%) are the most purchased brands. However, the sample pointed out that they do not follow the brands they consume on any social network, because they consider it does not provide useful or entertaining information.

Figure 5. Advertising interest

Figure 6. Main brands consumed by Generation Z

Regarding technology brands, only 15% of the sample is aware of the meaning of the metaverse, relating it to virtual worlds and network connectivity. In fact, 40% responded that they don't know what "metaverse" means. 10% answered that NFTs are digital items or Non-Fungible Tokens. This shows that the surveyed Centennials are not inclined to these products, nor do they show interest in them.

4. Discussion

The study countries present similarities in their online behaviors and consumption patterns, prioritizing the same social networks and buying from similar brands. The main difference lies in the topics of conversation, as the context of each country is different and is an influential factor. Their interests –both in conversation and actions– go hand in hand with current trends; this generates a very changing and complex Z profile.

Talking about trends reflects the Z's constant need to be updated and not fall behind. However, political and social cause debates are the least interesting to this population. Soccer is the most recurring topic. In addition to following trends, this research proves that experts and professionals are unaware of the importance that Centennials attach to their online security and privacy, as the Zs have their social media profiles in private mode and do not constantly post photofigures of themselves. With this data, **Almansa-Martínez**, **Fonseca** and **Castillo-Esparcia** (2013) findings are refuted.

Generation Z individuals have an observing role on their social media profiles and use the Internet and social media as their main sources of information, according to the study by **Gómez-de-Travesedo-Rojas** and **Gil-Ramírez** (2020). The fact that *WhatsApp* is the most used social network among Generation Z reflects their dislike of being disconnected, especially from their circle of friends. Similarly, there are coincidences with what was determined by **Garitaonandia** *et al.* (2020), who mention that young people use the Internet to communicate with their surroundings and for entertainment purposes.

Another characteristic of their online behavior is their ability to continue a conversation across different platforms. In this type of communication, visual resources and short phrases, along with the use of emojis and stickers, take priority, creating a unique symbolism in their language and emphasizing their digital qualities. This result is in line with the established findings by **Almansa-Martínez**, **Fonseca** and **Castillo-Esparcia** (2013) regarding the evolution of language among Generation Z youth.
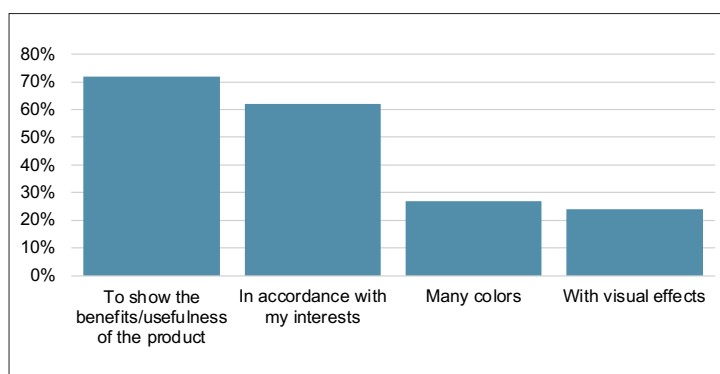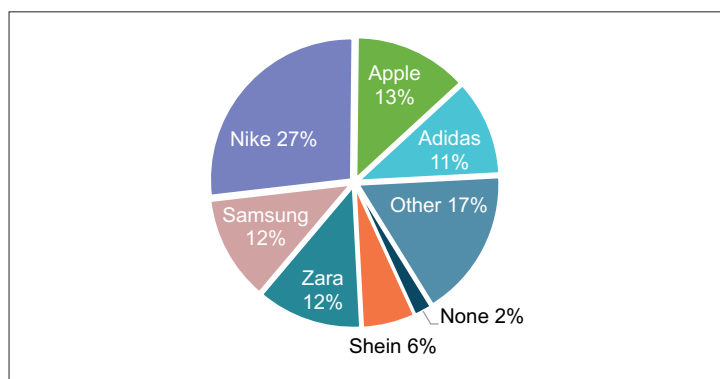
> Young people have a different notion of time than other generations. For them, time passes faster and the novel quickly loses that quality. When referring to "retro" issues, it is just 5-6 years old

Therefore, their online consumption can be divided into two categories: the content and information they seek and the purchases they make.

In the content typology, humorous and entertaining resources are preferred. Centennials claim that what they like most about being on social media is "laughing", which is consistent across all countries. *Instagram* and *TikTok* are the most used networks for this purpose.

> Talking about trends reflects the Z's constant need to be updated and not fall behind. However, political and social cause debates are the least interesting to this population. Soccer is the most recurring topic

However, these results differ from those found among Spanish Centennials, as *TikTok* and *Twitch* have made a strong impact on the lives of the Generation Z in Spain, according to the work of **García-Rivero**, **Martínez-Estrella** and **Bonales-Daimiel** (2022), which does not occur among young people in the countries analyzed in the present study (especially with regard to *Twitch*). Therefore, the preference for social networks among this cohort cannot be homogenized.

According to the way of purchasing, most Centennials said that they continue to buy in person and those who decide to buy online, decide to check the product reviews made by influencers, friends, or people with "many followers". Product reviews on social networks become one of the most viewed content, as mentioned by **Hernández** and **Andrade-del-Cid** (2020) and this is a variable that brands must consider in their campaigns. Although influencers are media references for this generation (**Elexpuru** *et al.*, 2021), it should be noted that there is no dependence of variables and, therefore, it cannot be sustained if men or women follow more influencers. Thus, this study refutes the assertion of **Djafarova** and **Bowes** (2021), who established that women follow more fashion influencers, being a variable that intervenes in their purchasing process.

The most purchased brands are the same in the four countries and although Z-ers are not interested in debating technology, they do care about buying cutting-edge devices, with *Apple* and *Samsung* being the best-positioned brands. This also shows the great notoriety and global recognition obtained by brands such as *Adidas* or *Nike* among the youth population.

Regarding the cultural characteristics of each country, it is noted that although they share a language, there are differences in how they speak it; in Panama and Mexico, it is common for young people to use Anglicisms, expressions, and words in English in their conversations or posts, showing a clear influence from the United States. It should be mentioned that in no country is importance given to indigenous origins, having primarily a capitalist and consumerist mindset.

There is also not excessive concern for the preservation of natural resources or roots. This situation continues to be one of the main problems that must be addressed in the Latin American region (**Oszlak**, 2010).

> "There is no concern or interest in knowing their past, their history; it seems that they are at odds with anything that is old" (high school teacher, Panama).

Regarding their beliefs, Catholicism is not openly rejected in any country. Panama and Mexico are the countries with the highest percentage of Centennials posting messages related to religion, indicating a behavior that tends to be conservative. However, it is noted that in Mexico, despite being a country with a high number of Catholic believers, there is greater acceptance of the LGTBIQ+ community, which does not happen in Panama.

Experts and the Centennials themselves indicate that they have a limited openness to difference, emphasizing the trend in their behavior of being individualists.

> "In times when difference is proclaimed, certain differences are not accepted, only those that they believe are convenient" (social studies expert, Colombia).

Generally speaking, Gen Z cares about maintaining their image. However, it has been found that there is an excessive focus on physical appearance in Colombian culture. Both experts and survey participants mentioned that taking care of their physical appearance is a priority in their lives. On the other hand, Chilean youth has a cultural trait of being nationalist; its youth continuously discusses political issues and the direction of their country, demanding greater youth participation.

The findings of this research confirm that the Z generation easily perceives advertising; however, they prefer those that they consider provide valuable information, teach them something, or communicate the utility of the promoted product or service. It is relevant to note that, according to Centennials, advertisements posted on *Instagram* are easily detected as advertising, while many of those appearing on *TikTok* are defined as platform-specific content, which is an advantage for brand strategy design.

> Communication with this generation must be open, bidirectional, and multi-platform, avoiding rigid structures

5. Conclusions

In conclusion, the results provided offer a detailed view of the behavior and digital consumption patterns of Generation Z, as a way of exploring in Mexico, Colombia, Chile, and Panama. First, it should be highlighted that the differences between Z1 and Z2 are slightly smaller, as the main difference lies in their conversation topics; a situation that is linked to their age and the stage of life they are going through.

> Generation Z individuals have an observing role on their social media profiles and use the Internet and social media as their main sources of information

Next, in terms of cultural characteristics, they maintain a dominant religious aspect and detachment from their origins; there is a particular disinterest in history. However, a single communication approach cannot be used for all four countries, as the main cultural difference is in the use of language. There are two languages present:

- Z, composed of symbols and abbreviations;
- cultural, made up of Anglicisms and expressions specific to each country.

Regarding their behavior, it can be highlighted that Centennials prioritize themselves, so they take care of their image and body; Z2 have a greater concern for this. Zs are not a completely open-minded generation towards diversity, because their own interests are the most important, this is related to individualistic traits in their lifestyle. They also demand attention, respect for their rights and do not accept impositions; they are not satisfied with absolute truths, even less so if they are imposed by adults with traditional arguments. With open access to information, data comparison is constant and is part of their daily lives, which makes everything debatable, contrastable, and refutable. For these reasons, communication with this generation must be open, bidirectional, and multiplatform, avoiding rigid structures.

The qualitative and quantitative research conducted determines that communication directed towards this target audience must use short and impactful messages, using the characteristic language of Centennials, as the attention span of Zs on timelines must not be forgotten. Additionally, this study determines an evolution in their consumption of information and entertainment, as Zs prefer social networks that prioritize image and immediacy, such as *Instagram* and *TikTok*.

In terms of consumption patterns, this generation prioritizes technological consumption –understood as the acquisition of new devices– which is closely related to their hyperconnectivity, as digital tools are part of their daily dynamics and they are not easily surprised by this type of product. Similarly, it can be noted that they prefer to buy in physical stores rather than online.

Centennials seek honesty and consistency between the actions and discourse of the brand. Pretentious messages cannot be designed. Furthermore, it is established that this generation easily perceives advertising content, which if it generates any kind of value –informative, utilitarian– will be well received. Therefore, the biggest challenge for brands is the factor of surprise. For this reason, the use of social listening tools is suggested to allow them to identify Z trends in real-time and thus become part of their conversation organically.

The Centennial consumer will be increasingly demanding, especially with the content they want to receive; they may even be willing to change brands if they find one that is more personalized and suited to their interests and tastes, always looking for more quality instead of volume. The Zs expect to find authentic brands, which demands that organizations create specific narratives for this audience.

As future lines of research, it is proposed to compare these results with the Gen Z young people from other Spanish-speaking countries to study their differences and similarities. Similarly, it would be interesting to sample and study in more countries in Latin America, in order to have a radiofigurey of this generation in the region and to take into account other countries outside of America. As a result, a broader vision of the Zs could be obtained, regardless of their geofigureical location.

Finally, it is considered necessary to unify criteria on the part of the scientific community about the years that define this cohort, as there are many proposals in this regard. In this sense, this research has considered the age range most used by communication and social sciences researchers, with the intention of unifying criteria and serving as a precedent.

> This study determines an evolution in their consumption of information and entertainment, as Zs prefer social networks that prioritize image and immediacy, such as *Instagram* and *TikTok*

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Evaluating the content strategy developed by universities on social media

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Abstract

Institutional communication is becoming a strategic instrument for universities, since it facilitates the relationships with their various publics and allows positioning of the institutional brand, which will contribute to building a distinctive reputation. The types of content disseminated by universities via their social media accounts will contribute decisively to these objectives, since the way in which the different topics are communicated may influence the publics' perceptions of these higher education institutions. This research analyses the different types of content disseminated by universities (in Europe, the United States and Latin America) via their accounts on social networks (*Twitter*, *Facebook*, and *LinkedIn*), to assess the main content topics that define the universities' communicative positioning. A content analysis of the publications by universities on their social networks was carried out, representing an appropriate method to recognize the main themes and topics of their communication strategy. The results reveal two main thematic blocks of content: functional (teaching, research and social commitment topics) and institutional (organizational and contextual topics). Institutional publications are the most relevant block of content, far above the functional posts. In terms of specific topics, the organizational ones are the most common, well above publications on teaching or research, while contextual and social commitment content is used marginally. Most universities, in all regions and on all social networks, follow a dominant strategy of institutional content. So, the higher education institutions are mainly using social networks as a strategic tool for institutional positioning, more than informing about their daily activity.

Keywords

1. Introduction

University institutions contribute to the economic development of their environment and generate significant social value (**Kimmons**; **Veletsianos**; **Woodward**, 2017; **Kisiolek**; **Karyy**; **Halkiv**, 2020; **Melewar** *et al*., 2018). The important role of universities is manifested by way of three main functions.

- The first is *teaching*, focusing on training people, which will be highly valuable for the whole community (**Kisiolek**; **Karyy**; **Halkiv**, 2020; **Marino**; **Lo-Presti**, 2018; **Plungpongpan**; **Tiangsoongnern**; **Speece**, 2016).
- Their second function is *research*, acting as an engine to generate scientific knowledge, which contributes to cultural, social, and economic development (**Simancas-González**; **García-López**, 2017; **Plungpongpan**; **Tiangsoongnern**; **Speece**, 2016; **Kisiolek**; **Karyy**; **Halkiv**, 2020; **Marino**; **Lo-Presti**, 2018).
- A third area of responsibility corresponds to the so-called Third Mission, related to their *social commitment*, seeking to provide solutions to social problems and needs (**Sutton**; **McEachern**; **Kane**, 2018; **Marino**; **Lo-Presti**, 2018; **Carpenter** *et al*., 2016; **Gori** *et al*., 2020).

In the current competitive context, universities need to communicate their academic, research and social commitment performance proactively, but also inform about the management of the institution itself and give their opinion concerning the important issues in their environment. Institutional communication thus becomes a strategic instrument that enables enhanced functioning of the institution and a better integration with and understanding by society. By selecting their most relevant content and combining different topics, universities generate a concrete communicative positioning that contributes to achieving their general objectives.

2. Theoretical framework

2.1. Universities' digital institutional communication

Institutional communication has become an essential tool to promote the mission of the university, develop its functions and achieve its objectives as an institution (**Chapleo**; **Carrillo-Durán**; **Castillo-Díaz**, 2011; **Davies**, 2020; **Brzakovic**; **Brzakovic**; **Brzakovic**, 2019; **Gordon-Isasi**; **Narvaiza**; **Gibaja**, 2021).

Such communication is a fundamental instrument of the university to dialogue with all its publics. On the one hand, it facilitates exchange and relationships with internal publics (**Melewar** *et al*., 2018; **Overton-de-Klerk**; **Sienaert**, 2016; **Simancas-González**; **García-López**, 2017; **Eger** *et al*., 2020; **Uslu**, 2018). On the other, it allows establishing an important interaction with the university's external publics, such as the different members of the social, cultural, political, and economic environment (**Marino**; **Lo-Presti**, 2018; **Edmiston-Strasser**, 2009; **Yusof** *et al*., 2018).

All of this allows promoting and positioning the institutional brand of the university, which will contribute to building and developing a solid, distinctive and differential reputation (**Foroudi** *et al*., 2017; **Sataoen**; **Wæraas**, 2016; **Rutter**; **Lettice**; **Nadeau**, 2017; **Edmiston-Strasser**, 2009; **Plungpongpan**; **Tiangsoongnern**; **Speece**, 2016; **Chapleo**; **Carrillo-Durán**; **Castillo-Díaz**, 2011; **Melewar** *et al*., 2018; **Grover**; **Kar**; **Ilavarasan**, 2019; **Simancas-González**; **García-López**, 2017; **Lee**; **Merle**, 2018; **Fähnrich**; **Vogelgesang**; **Scharkow**, 2020).

In an increasingly competitive higher education market, more and more universities are adopting institutional communication via the internet to design their communication strategies (**Lažetić**, 2019; **Xie**; **Teo**, 2020; **Peruta**; **Shields**, 2016), which makes it possible to more solidly and permanently dialogue with their publics (**Marino**; **Lo-Presti**, 2018; **Royo-Vela**; **Hünermund**, 2016; **Albanna**; **Alalwan**; **Al-Emran**, 2022), creating a fluid conversation (**Atarama-Rojas**; **Vega-Foelsche**, 2020; **Eger** *et al*., 2020) and enhancing relationship-building (**Gori** *et al*., 2020; **Kimmons**; **Veletsianos**; **Woodward**, 2017).

A significant amount of international research in recent years has focused on highlighting the importance of universities' digital institutional communication at all levels (**Ebrahim**; **Seo**, 2019; **Gori** *et al*., 2020; **Kisiolek**; **Karyy**; **Halkiv**, 2020; **Martínez-Cardama**; **Pacios**, 2020; **Brech** *et al*., 2017; **Xie**; **Teo**, 2020). It serves to give greater visibility to their institutional discourse (**Marino**; **Lo-Presti**, 2018), helping to meet the public's needs for information (**Kimmons**; **Veletsianos**; **Woodward**, 2017) and enabling institutions to become a source of information for all those with an interest in university matters (**Fähnrich**; **Vogelgesang**; **Scharkow**, 2020; **Kisiolek**; **Karyy**; **Halkiv**, 2020).

Likewise, **Oliveira**, **Capriotti** and **Zeler** (2022) carried out an extensive bibliometric review on scientific research on digital communication in universities in the last 30 years and pointed out that studies on the use of social networks in these institutions have grown in the last decade, demonstrating the importance it has acquired for academics and communi-

cation professionals. Various studies coincide in pointing out that there has been growth in the use of social networks by universities for more than a decade, but that their effectiveness remains at very low levels, not taking advantage of all the possibilities of social media. According to **Simancas-González** and **García-López** (2022), the use of social networks by universities is one of the issues that has aroused the most attention in recent years, especially on *Facebook* and *Twitter*. There is also a growing use of *Instagram* (**Alcolea-Parra**; **Rodríguez-Barba**; **Núñez-Fernández**, 2020), *LinkedIn* (**Cestino-González**, 2020) and *YouTube* (**Simancas-González**; **Blanco-Sánchez**, 2022). However, the use of social networks by universities is not homogeneous (**Simancas-González**; **Blanco-Sánchez**, 2022), since a few entities (the most prestigious in research or teaching) tend to publish a greater number of contents that tries to inspire and motivate their users, while a large majority of institutions focus mainly on content with a more unidirectional approach and institutional self-promotion (**Simón-Onieva**, 2017; **Segura-Mariño**; **Paniagua-Rojano**; **Fernández-Sande**, 2020).

2.2. Key contents of university communication

The Internet, in general, and the social networks, particularly, are suitable channels for universities to disseminate their different contents among their stakeholders (**Atarama-Rojas**; **Vega-Foelsche**, 2020; **Fähnrich**; **Vogelgesang**; **Scharkow**, 2020; **Peruta**; **Shields**, 2016). Some authors (**Marino**; **Lo-Presti**, 2018; **Peruta**; **Shields**, 2016; **Bélanger**; **Bali**; **Longden**, 2014) highlight that the content disseminated by universities will contribute decisively to their positioning and reputation, since the way in which the content is communicated through the Internet may influence the publics' perceptions of these higher education institutions.

In a bibliometric review of three decades of studies about the institutional communication of universities, **Zeler**, **Capriotti** and **Oliveira** (2023) point out that the topics disseminated by higher education institutions have been a key aspect of the research done about their institutional communication. Other specific studies also found similar results (**Atarama-Rojas**; **Vega-Foelsche**, 2020; **Oliveira**, 2020; **Simancas-González**; **Blanco-Sánchez**, 2022; **Simancas-González**; **García-López**, 2022). Five main thematic roles of universities can be acknowledged: teaching, research, social commitment, organizational, and regarding their context. The dissemination of information concerning each of them will help strengthen a certain profile and establish a communicative positioning of each of the university institutions.

Teaching content

Related to academic life, training programmes and teaching activity (which will enhance *academic positioning*), it includes information on undergraduate and postgraduate activity, teacher and student mobility, internationalization, etc. (**Di-Nauta** *et al*., 2020; **Ebrahim**; **Seo**, 2019; **Fähnrich**; **Vogelgesang**; **Scharkow**, 2020).

Research content

Related to the projects and research activity of the university, as well as the research outcomes (which will boost its *research positioning*). This encompasses content on R&D& I projects, doctorates and publications resulting from research (**Alonso-Flores** *et al*., 2020; **Atarama-Rojas**; **Vega-Foelsche**, 2020; **Fähnrich**; **Vogelgesang**; **Scharkow**, 2020).

Social commitment content

Focusing on the "third mission" of the institution: its social integration, links, and commitment, as well as its USR and sustainability projects and activities (which will promote its *social positioning*) (**Di-Nauta** *et al*., 2020; **Gori** *et al*., 2020; **Marino**; **Lo-Presti**, 2018).

Organizational content

Informing and promoting its operation and general activity, as well as the daily performance of its managers, to render the administration of the university transparent to its multiple publics (which will boost its *organizational positioning*) (**Atarama-Rojas**; **Vega-Foelsche**, 2020; **Ebrahim**; **Seo**, 2019; **Fähnrich**; **Vogelgesang**; **Scharkow**, 2020).

Contextual content

The dissemination of topics or events of the general environment (social, economic, cultural, etc.) and, in some cases, disseminating an opinion or adopting a stance on them (which can establish their *environmental positioning*) (**Atarama-Rojas**; **Vega-Foelsche**, 2020; **Ebrahim**; **Seo**, 2019).

From this five specific contents linked to university activity, two main general blocks of information can be recognized: *Functional* and *Institutional*.

Functional

An initial, general block of content, of an essential or basic nature, which we can call "*Functional*" (**Fähnrich**; **Vogelgesang**; **Scharkow**, 2020; **Alonso-Flores** *et al*., 2020; **Overton-de-Klerk**; **Sienaert**, 2016; **Vogler**; **Schäfer**, 2020; **Carpenter** *et al*., 2016; **Schwetje** *et al*., 2020), focuses on all information on the development of activities related to the three main roles or functions of universities: their teaching activity, research activity, and social actions.

Institutional

The second general block of content, which complements the previous one, which we will call "*Institutional*", focuses on the dissemination of content on the running and management and the governance of the university itself (organizational

content) and on the opinion or position of the entity regarding the key aspects and events related to the environment (contextual content) (**Atarama-Rojas**; **Vega-Foelsche**, 2020; **Simancas-González**; **García-López**, 2017; **Marino**; **Lo-Presti**, 2018; **Ebrahim**; **Seo**, 2019).

3. Scope of research

The main objective of this research is to acknowledge and analyse the different types of content disseminated by a set of benchmark international universities (in Europe, the United States and Latin America) on their main social networks (*Twitter*, *Facebook*, and *LinkedIn*), which allows identifying and evaluating the general lines of content that define the universities' communicative positioning.

4. Methodology

The universities were chosen based on two criteria: geographical area of location and presence and position in the main international rankings. On the one hand, the research focuses on the following areas: Europe, as it is a clear benchmark for higher education at international level; the United States, as an area in itself, due to the large number of universities present in the rankings and the preponderant place enjoyed in many of them; and Latin America, for its high potential and level of university development. Also, the position occupied in the 2020 edition of the three most prestigious international rankings (the most up-to-date at the time of performing sample selection) was taken as a reference:

- *Academic Ranking of World Universities*, (*ARWU*).
- *Times Higher Education Ranking* (*THE*).
- *QS World University Ranking*.

For the European and US universities, their position among the top 100 entities in the rankings was taken into account. In the case of Latin American universities, as they are not found among the top 100 in any of the rankings, they were chosen on the basis of their global position. A total of 70 universities were chosen: 20 from the United States, 25 from Europe, and 25 from Latin America (Table 1). Among European and Latin American universities, priority was given to geographical diversity, selecting 25 entities (instead of 20 as in the US, with a more unified sector), in order to achieve greater representativeness of universities from different countries.

Table 1. Universities studied

Europe	United States	Latin America
University of Oxford	*Harvard University*	*Universidad de Buenos Aires*
University of Cambridge	*Stanford University*	*Universidad Nacional de Córdoba*
University College London	*Massachusetts Institute of Technology* (*MIT*)	*Universidad Nacional de La Plata*
Imperial College London	*Princeton University*	*Universidad Austral*
University of Edinburgh	*Columbia University*	*Universidade de São Paulo*
University of Manchester	*California Institute of Technology* (*Caltech*)	*Universidade de Campinas*
King's College London	*University of Chicago*	*Universidade Federal de Rio de Janeiro*
University of Bristol	*Yale University*	*Universidade Federal de Minas Gerais*
London School of Economics and Political Science	*Johns Hopkins University*	*Universidade Católica de Rio de Janeiro*
University of Warwick	*University of Pennsylvania*	*Universidade Católica de Rio Grande do Sul*
Sorbonne Université	*University of Michigan - Ann Arbor*	*Universidad de Chile*
Paris Sciences et Lettres (PSL)	*University of North Carolina - Chapel Hill*	*Pontificia Universidad Católica de Chile*
Paris Saclay	*University of California - Berkeley*	*Universidad de Concepción*
Heidelberg University	*University of Washington - Seattle*	*Universidad de Santiago de Chile*
University of Munich (LMU)	*Purdue University - West Lafayette*	*Universidad Nacional de Colombia*
Technical University of Munich	*University of Illinois - Urbana Champaign*	*Universidad de Antioquia*
Swiss Federal Institute of Technology Zurich	*University of Texas - Austin*	*Pontificia Universidad Javeriana*
University of Zurich	*University of Wisconsin - Madison*	*Universidad de Los Andes (Colombia)*
Swiss Federal Institute of Technology Lausanne	*University of Maryland - College Park*	*Universidad Nacional Autónoma de México*
Utrech University	*University of Minnesota - Twin Cities*	*Universidad Autónoma Metropolitana*
University of Amsterdam		*Benemérita Universidad Autónoma de Puebla*
Karolinska Institute		*Tecnológico de Monterrey*
University of Oslo		*Universidad Nacional Mayor de San Marcos*
University of Helsinki		*Universidad San Francisco de Quito*
University of Copenhagen		*Universidad de la República*

For the selection of the social networks for analysis, their relevance for universities' digital institutional communication was considered.

- *Facebook*, as it is the social platform with the highest number of active users monthly worldwide; and it allows institutions to share content about their values and activities (**Capriotti**; **Zeler**; **Oliveira**, 2019), which favors universities to develop their own stories and interact with their community (**Eger** *et al.*, 2020).
- *Twitter*, due to its important role in disseminating information; characterized by people re-tweeting other's content on current issues in real time (**Capriotti**; **Ruesja**, 2018), which fosters greater interaction of higher education institutions with their environment (**Kimmons**; **Veletsianos**; **Woodward**, 2017).
- *LinkedIn*, as it is a reference platform for professional and work-related activity, for which it promotes and contributes to the employability discourse that is a key aspect of university purpose (**Komljenovic**, 2019).

The official institutional (corporate) accounts of the chosen universities on the three selected social networks were analyzed. Universities have many profiles on social networks, but the institutional corporate account is the one that all higher education institutions have available, which allows for a more appropriate comparative analysis between universities, regions and networks. To identify the different official profiles of each university on social networks, we resorted to the universities' own websites, the most popular Internet search engines, and also the search engines of each social network.

The defined unit of analysis consists of the publications, both proprietary and shared, by the selected universities on their official institutional *Facebook*, *Twitter*, and *LinkedIn* accounts. All publications made during a six-month period of 2021 were recorded: Three months in the first semester, from 15 March to 14 June (13 weeks, 91 days), and three months in the second semester, from 15 September to 14 December (13 weeks, 92 days). In total, 26 weeks and 183 days. A broad period was established to obtain a significant volume of information for analysis and to avoid possible biases produced by specific situations or actions, as could be the start of the university academic year, a special event, or a specific crisis. All publications were selected rather than a sample selection of publications, in order to obtain complete, reliable data on the volume and intensity of the universities' communication activity. The 70 universities analysed disseminated 99,954 publications through their profiles on social networks.

To achieve our general objective, the following research questions (RQ) were raised:

RQ1. What types of content have the universities posted on their social networks?

RQ2. Are any significant differences found between regions?

RQ3. Are there significant differences between platforms?

RQ4. Can groups of universities with similar approaches or lines of communication be recognized in relation to their content?

To work on the research questions, a content analysis of the publications of the universities on their social networks was carried out, since it represents an appropriate method to reliably recognize the visible communication strategy of their contents.

For RQ1, the "content" category of analysis was defined. It will allow recognizing and analysing the relevant topics dealt with by the universities on their social networks (**Capriotti**; **Zeler**; **Oliveira**, 2019; **Capriotti**; **Ruesja**, 2018; **Capriotti**; **Losada-Díaz**, 2018). To this end, five main themes were identified:

- *Teaching*: information relating to training activity and the teaching-learning process, both undergraduate and postgraduate, as well as teaching activities, methodologies, academic outcomes, evaluations of faculty, awards, teaching publications, etc.
- *Research*: information related to the research activity of the university (R&D&I projects, doctorates, research, scientific publications, etc.).
- *Social commitment*: information related to the university's sustainable action, as well as its social activity and its link with the community.
- *Organizational*: information on the general running and governance of the university (positions, roles, structure, appointments, etc.).
- *Contextual*: information on general issues (social, economic, cultural, etc.) of the environment. Each of the publications analysed could be categorized into a maximum of two topics.

From these five types of content, two large blocks of information were defined:

- the first three (teaching, research, and social commitment) make up the "*Functional*" block (referring to the three essential functions of the institution);
- while the last two (organizational and contextual) constitute the "*Institutional*" block (related to the general management of the entity).

For RQ2, in order to determine whether there are significant differences between the regions to which the universities analysed belong, a one-factor Anova analysis was performed. The comparison of the mean publications of the types of content analysed allows seeing whether there are differences between the regions of the universities analysed (Europe, United States and Latin America) and if these differences are significant.

For RQ3, a one-factor Anova analysis was applied in which the means of the content topics were compared with respect to the social networks used (*Twitter*, *Facebook*, and *LinkedIn*), to identify whether there are significant differences between the groups analysed and determine whether the use of one social network or another generates differences with respect to the type of content published.

For RQ4, a cluster analysis was applied, which allows identifying groupings of subjects from the values observed in the total of a set, with the aim of recognizing whether there are groups of universities that could have similar communication approaches or lines in relation to the contents. First, a two-step cluster analysis was carried out using the log likelihood measure and Bayesian information criterion to determine the number of clusters to be extracted. The K-Means method was then used to extract the clusters based on content type. Subsequently, a simple correspondence analysis was performed to be able to observe the existing distances between the conglomerates and the different regions to which the universities belong.

The collection and processing of information was carried out by an external company, *Noticias Perú*, via its platform and mass data and information collection and management system:
https://www.noticiasperu.pe

To this end, two work teams in that company were set up:
- one team of three people (one supervisor and two technicians) for the search and retrieval of publications, and
- another team of three people (one supervisor and two analysts) for the initial data extraction and analysis.

The period to collect and process the posts was from 15 March to 30 June and from 15 September to 30 December 2021.

Intercoder reliability and agreement allow evaluating the degree of consistency in the implementation of an analysis system. To evaluate the reliability of the method used, the two analysts carried out a test on a sample of 300 publications using a random procedure. This sample is highly satisfactory for properly evaluating concordance and reliability between two analysts (**Lombard**; **Snyder-Duch**; **Bracken**, 2002). Based on 2×2 contingency tables as a basis for statistical analysis and with a 95% confidence interval, the percentage calculation of agreement between the two analysts is established, to ascertain whether the observations by both obtain similar results. Cohen's kappa coefficient (k) is also calculated to assess the reliability of the categorical variables (**McHugh**, 2012).

To interpret the results of Cohen's kappa coefficient, the measurement ranges proposed by **Landis** and **Koch** (1977) are applied:
- 0.01-0.20 slight agreement;
- 0.21-0.40 fair agreement;
- 0.41-0.60 moderate agreement;
- 0.61-0.80 substantial agreement;
- 0.81-1.00 near perfect or perfect agreement.

For the interpretation of the results of the level of agreement, the equivalent percentages are applied. The following percentage of agreement was obtained: 91% for Topic 1 (Kappa value .83) and 90% for Topic 2 (Kappa value .80), demonstrating high agreement in the criteria of the tool, and so it can be concluded that the measurement is adequate.

The data were recorded in an Excel template and subsequently analysed using *IBM SPSS Statistics 25* software for statistical processing and to obtain the results by the research team.

5. Results

5.1. Types of content

Regarding the general types of information (Table 2), the "functional" block, which includes the thematic contents of *teaching*, *research* and *social commitment*, accounts for 30.5% of all publications. The "institutional" block, with contents related to *organizational* and *contextual* issues, accounts for 69.5%. The greater proportional weight of general publications of an institutional scope is also observed by region: in the United States they amount to 77.4%, in Europe they are at the general average (70.6%), and in Latin America they represent 64.8%.

In relation to specific thematic contents, *organizational* ones are those most produced (66.4%), followed by *teaching* (19.9%) and *research* (7.6%) and to a lesser proportion those concerning the university *context* (3.2%) and *social commitment* (3.0%).

Taking the analysis by social networks (Table 3), *Twitter* is the social network most used by all the universities analysed to disseminate their publications (58.2%; n=58,156), followed by *Facebook* (31.3%; n=31,070), and *LinkedIn* (10.7%; n=10,728). By social network and type of content published, a priori there are no major differences in their distribution by blocks, and a balanced distribution is observed between them, except on *Facebook*, which has a greater proportional weight of the "functional" field.

Table 2. Marginal distribution of the number of publications by types of thematic content, block, and region

Blocks	Topics	Region							
		Europe		USA		Latin America		Total	
		n	%	n	%	n	%	n	%
Functional	Teaching	4,221	17.5	3,449	13.0	12,203	24.7	19,873	19.9
	Research	2,614	10.9	2,248	8.5	2,761	5.6	7,623	7.6
	Social commitment	236	1.0	293	1.1	2,424	4.9	2,953	3.0
	Total	7,071	29.4	5,990	22.6	17,388	35.2	30,449	30.5
Institutional	Organizational	16,544	68.8	20,293	76.6	29,503	59.7	66,340	66.4
	Contextual	438	1.8	221	0.8	2,506	5.1	3,165	3.2
	Total	16,982	70.6	20,514	77.4	32,009	64.8	69,505	69.5
Total		24,053	100	26,504	100	49,397	100	99,954	100

Table 3. Proportional distribution of publications by block and social network

Blocks	Topics	Social networks			
		Twitter (%)	Facebook (%)	LinkedIn (%)	Total (%)
	Functional	27.9	35.3	29.9	30.5
	Institutional	72.1	64.7	70.1	69.5
Total		58.2	31.3	10.7	100

5.2. Differences among regions

By thematic blocks (Table 4), each of the universities generated a mean of 992.9 publications of the "institutional" block, with statistically significant differences being observed by region (Anova F value = 16.280; sig.=0.001) and the regions of Latin America and the United States being placed above the mean. In the "functional" block, the mean reached 434.9 publications, with significant differences by region (Anova F value = 16.282; sig.=0.001), with the Latin American region (x̄=695.5; σ=692.450) standing out.

Table 4. Anova test of publications by content, blocks and region

Contents/Blocks	Región									
	Europe		USA		Latin America		Total		Anova	
	x̄	σ	x̄	σ	x̄	σ	x̄	σ	Sig*	F
Teaching	168.8	121.309	172.4	142.021	488.1	493.643	283.9	344.877	0.001	8.252
Research	104.5	90.929	112.4	91.512	110.4	99.557	108.9	92.955	0.957	0.044
Social commitment	9.4	14.849	14.6	17.288	96.9	142.875	42.2	94.629	0.001	7.824
Functional	**282.8**	**181.945**	**299.5**	**186.919**	**695.5**	**692.450**	**434.9**	**475.620**	**0.001**	**16.282**
Organizational	661.7	444.143	1,014.6	547.627	1,180.1	982.543	947.7	733.128	0.037	3.474
Contextual	17.5	22.142	11.0	8.332	100.2	198.185	45.2	124.758	0.020	4.144
Institutional	**679.3**	**456.979**	**1,025.7**	**551.293**	**1,280.3**	**1132.228**	**992.9**	**817.378**	**0.001**	**16.280**
*Significance value p<0.05										

In the "functional" block, some notable differences are observed by regions. *Teaching* content has an average of 283.9 publications per university, and Latin America is positioned comparatively as the region with the highest activity, both in terms of internal production (24.7%) and concerning mean number of publications (x̄=488.1; σ=493.643). Concerning *research* content, the activity of European universities (10.9%) and US universities (8.5%) practically doubles that of Latin American universities (5.6%), but without observing statistically significant differences in terms of the mean (x̄=108.9; σ=92.955), although the activity of US universities is slightly higher (x̄=112.4; σ=91.512). Regarding *social commitment* content, its proportional weight among universities in Europe and the United States is secondary (< 5%) and has an average of less than 15 publications per university compared to an average of 96.9 publications by Latin American universities.

In the "institutional" block, in the three regions *organizational* contents are of greatest attributed importance (> 65%) and notable and significant differences are also recorded between regions, with a higher mean in the universities of the United States (x̄=1,014.6; σ=547.627) and Latin America (x̄=1,180.1; σ=982.543). *Contextual* content is less important for European universities (1.8%) and US universities (0.8%) than for Latin American universities (5.1%).

5.3. Differences among social networks

The internal analysis for each social network of the types of content and regions reveals some statistically significant differences (Table 5).

On *Twitter*, within the "functional" block, differences are observed by regions in terms of mean *teaching* content ($\bar{x}$=152.3; σ=188.130) and *social commitment* ($\bar{x}$=21.9; σ=54.396). In both cases, universities in Latin America score a higher mean (*teaching*: $\bar{x}$=242.1; σ=267.983 and *social commitment:* $\bar{x}$=49.9; σ=84.030). In the "institutional" block, there are no differences by region for *organizational* content, although the mean of the United States ($\bar{x}$=715.8; σ=508.852) is slightly higher than the other regions, but differences are observed for *contextual* contents, where Latin American universities achieve a higher mean ($\bar{x}$=57.7; σ=115.918).

On *Facebook*, the published content is related to the "functional" block, as it is the social network with the highest proportion of this type of posts. By regions, statistically significant differences are observed in all contents: in *teaching*, Europe ($\bar{x}$=57.2; σ=52.851) and Latin America ($\bar{x}$=215.4; σ=257.256) behave differently from the United States ($\bar{x}$=28.6; σ=30.268). Regarding *research* content, the European universities publish proportionally more content (11.9%) than the other regions, but for *social commitment*, Latin American universities are more productive ($\bar{x}$=43.3; σ=67.905). In the "institutional" block, the United States is the region that, proportionally, generates the most publications of *organizational* content (76.9%) although Latin America is again the one with the highest output ($\bar{x}$=468.1; σ=432.838). On *contextual* content, the output by universities in Europe ($\bar{x}$=3.1; σ=3.402) and the USA ($\bar{x}$=1.5; σ=2.819) is marginal.

LinkedIn is the social network used least by the universities, although with a greater proportional weight in the set of the three social networks by European universities (Europe = 18.1%, United States = 11.9%, Latin America = 6.5%). It is the only one where no statistically significant differences are observed between regions for any of the published contents. The overall mean of "functional" ($\bar{x}$=45.8; σ=49.399) and "institutional" ($\bar{x}$=107.4; σ=92.293) contents does not vary according to region, although in Europe there is slightly greater interest in the "functional" block ($\bar{x}$=53.4; σ=51.061) and in the United States in the "institutional" block ($\bar{x}$=123.5; σ=86.904).

Table 5. Marginal distribution and Anova test of publications by types of thematic content, social networks and region

Social network	Content	Region						Anova	
		Europe		USA		Latin America			
		n	%	n	%	n	%	Sig*.	F
Twitter	Teaching	2,108	15.5	2,501	13.3	6,051	23.5	0.008	5.266
	Research	1,262	9.3	1,571	8.4	1,238	4.8	0.150	1.953
	Social commitment	104	0.8	184	1.0	1,249	4.8	0.004	5.497
	Functional	3,474	25.5	4,256	22.7	8,538	33.1	0.020	4.145
	Organizational	9,831	72.2	14,317	76.4	15,810	61.3	0.069	2.781
	Contextual	309	2.3	177	0.9	1,444	5.6	0.033	3.578
	Institutional	10,140	74.5	14,494	77.3	17,254	66.9	0.810	2.612
	Total	**13,614**	**100**	**18,750**	**100**	**25,792**	**100**		
Facebook	Teaching	1,431	23.5	572	12.5	5,385	26.4	0.001	9.584
	Research	723	11.9	380	8.3	1,216	6.0	0.015	4.486
	Social commitment	106	1.7	75	1.6	1,084	5.3	0.001	7.412
	Functional	2,260	37.1	1027	22.4	7,685	37.7	0.001	9.623
	Organizational	3,754	61.6	3,524	76.9	11,702	57.3	0.001	10.325
	Contextual	76	1.2	31	0.7	1,011	5.0	0.018	4.298
	Institutional	3,830	62.9	3,555	77.6	12,713	62.3	0.001	9.985
	Total	**6,090**	**100**	**4,582**	**100**	**20,398**	**100**		
LinkedIn	Teaching	682	15.7	376	11.9	767	23.9	0.465	0.774
	Research	629	14.5	297	9.4	307	9.6	0.112	2.265
	Social commitment	26	0.6	34	1.1	91	2.8	0.105	2.330
	Functional	1337	30.7	707	22.3	1165	36.3	0.478	0.747
	Organizational	2,959	68.0	2,452	77.3	1,991	62.1	0.248	1.424
	Contextual	53	1.2	13	0.4	51	1.6	0.112	2.260
	Institutional	3,012	69.3	2,465	77.7	2,042	63.7	0.271	1.333
	Total	**4,349**	**100**	**3,172**	**100**	**3,207**	**100**		

*Significance value p<0.05

Table 6. Final cluster centers

Contents	Cl. 1	Cl. 2	Cl. 3	Cl. 4	Anova	
					F	Sig.
Teaching	21.53	32.53	14.31	11.42	113.239	0.000
Research	6.23	6.38	5.33	15.69	46.380	0.000
Social commitment	4.04	3.83	1.27	1.08	8.543	0.000
Organizational	63.29	55.08	77.64	70.63	72.352	0.000
Contextual	4.91	2.16	1.45	1.16	9.461	0.000
N (universities)	16	12	23	19		

5.4. Groups of universities with homogeneous content

To recognize whether there are groups of universities that may have similar approaches or lines of communication in relation to content, a cluster analysis was carried out. For grouping by means of this analysis, the variables used are the five content categories. In order to avoid the bias produced by the greater or lesser publishing activity observed in the descriptive part of the study, it was considered appropriate to transform them according to the specific weight that each content has on the total categories of content in each of the universities.

The two-step cluster test reveals the existence of four clusters with an adequate silhouette measure of cohesion and separation (0.5). Once the number of subgroups was determined, a K-Means analysis was performed to extract the profiles based on the content, obtaining convergence in interaction 3 and generating four homogeneous subgroups of universities (Table 6).

Regarding the region, the X^2 statistical test of independence (6) = 24,680 sig. 0.001, revealed that universities were uniformly represented in the four clusters and that both variables were statistically moderately associated (contingency coefficient 0.511). A subsequent analysis of simple correspondences showed that dimension 1 explained 93.7% of the inertia, allowing to observe, based on the score in dimension 1 (Graph 1), the proximity of the universities of Latin America to clusters 1 and 2, of the USA to cluster 3, and of Europe to cluster 4.

For the strategies used for the dissemination of content, statistically significant differences are also observed by cluster and social network (Table 7). When the content of the "functional" block is disseminated through *Twitter*, in clusters 1 and 2 a greater predisposition is observed for this network than in the rest of the clusters and in the "institutional" block between clusters 1 and 3. When the network used is *Facebook*, cluster 2 differs notably from the

Graph 1. Correspondence analysis. Biplot. Cluster-university region.

Table 7. Test Anova of the publications by content blocks y clusters

	Bloque Contenido		Twitter	Facebook	LinkedIn
Cluster 1	Functional	x̄	372.13	188.56	28.89
		σ	358.51	198.89	9.71
	Institutional	x̄	801.38	391.75	71.10
		σ	706.19	436.22	9.71
Cluster 2	Functional	x̄	263.08	376.00	41.45
		σ	366.57	447.30	9.13
	Institutional	x̄	360.33	392.75	58.55
		σ	305.69	460.18	9.13
Cluster 3	Functional	x̄	166.26	76.22	20.98
		σ	167.94	111.26	8.07
	Institutional	x̄	661.30	228.00	79.01
		σ	591.24	298.10	8.07
Cluster 4	Functional	x̄	175.42	88.95	25.31
		σ	116.27	86.68	8.19
	Institutional	x̄	501.68	203.84	74.68
		σ	362.33	193.15	8.19
Anova		F	40.88	22.11	11.21
		Sig.	0.001	0.001	0.001

*Significance value $p<0.05$

rest when it comes to disseminating "functional" content, and in the "institutional" block, the greatest predisposition is detected in clusters 1 and 2. In *LinkedIn*, cluster 2 shows greater activity in the "functional" block and clusters 3 and 4 in the "institutional" one.

Thus, the 70 universities are distributed among the 4 clusters identified (Table 8), which have the following particularities.

- Cluster 1. Universities with a marked orientation of content from the "institutional" block, with above-mean values for *organizational* and *contextual* topics. The "functional" block has average values for *teaching* content, but above-average values for *social commitment*. It consists of universities in Latin America (62.5%) and also in Europe (25.0%) and the United States (12.5%).

- Cluster 2. Universities with predominant "functional" content, especially for *teaching* content and, to a lesser extent, in *research* and *social commitment*. The "institutional" block shows below-average values for *organizational* content. Composed mainly of universities of Latin America (75.0%) and, to a lesser extent, of Europe (25.0%). No representation of US universities.

- Cluster 3. Universities with a moderate line in the "functional" field, with average values for *teaching* content, but below-average for *research* and *social commitment*. The "institutional" block stands out, especially for *organizational* content. This cluster has the highest proportion of US universities (47.8%), followed by European (34.8%) and Latin American (17.4%).

- Cluster 4. Universities with a predominance of the "functional" block, especially *research* and to a lesser extent *teaching*. The "institutional" block is above the general average, where *contextual* content is marginal. It consists mainly of European universities (52.6%) and, to a lesser extent, US universities (36.8%) and Latin American universities (10.5%).

Table 8. Clusters by universities and regions

Cluster	N	Universities	Distribution by regions
1	16	*Universidad Nacional de Córdoba* *Universidad Nacional de La Plata* *Universidade Federal de Minas Gerais* *Universidade Católica de Rio de Janeiro* *Pontificia Universidad Católica de Chile* *Universidad de Santiago de Chile* *Universidad Nacional de Colombia* *Universidad de los Andes* *Universidad Autónoma de México* *Benemérita Universidad Autónoma de Puebla*	Latin America (62.5%)
		Imperial College London *University of Edinburgh* *Warwick University* *Paris Saclay*	Europe (25.0%)
		Purdue University *University of Illinois*	United States (12.5%).
2	12	*Universidad de Buenos Aires* *Universidade Católica de Rio Grande* *Universidad de Antioquia* *Pontificia Universidad Javeriana* *Universidad Autónoma Metropolitana* *Tecnológico de Monterrey* *Universal Nacional Mayor de San Marcos* *Universidad San Francisco de Quito* *Universidad de la República*	Latin America (75.0%)
		University College London *London School of Economics and Political Science* *Technical University of Munich*	Europe (25.0%)
			United States (0.0%)
3	23	*Princeton University* *Columbia University* *University of Chicago* *Johns Hopkins University* *University of Michigan* *University of North Carolina* *University of California* *University of Washington* *University of Texas* *University of Wisconsin* *University of Maryland*	United States (47.8%)
		King's College London *University of Bristol* *Sorbonne Université* *Paris Sciences et Lettres* *Utrech University* *University of Amsterdam* *University of Oslo* *University of Copenhagen*	Europe (34.8%)
		Universidad Austral *Universidade Federal de Rio de Janeiro* *Universidad de Chile* *Universidad de Concepción*	Latin America (17.4%)
4	19	*University of Oxford* *University of Cambridge* *University of Manchester* *Heidelberg University* *University of Munich* *Swiss Federal Institute Zurich* *University of Zurich* *Swiss Federal Institute Lausanne* *Karolinska Institute* *University of Helsinki*	Europe (52.6%)
		Harvard University *Stanford University* *Massachusetts Institute of Technology* *Caltech* *Yale University* *University of Pennsylvania* *University of Minnesota*	United States (36.8%)
		Universidade de São Paulo *Universidade de Campinas*	Latin America (10.5%).

6. Conclusions

Based on the results obtained, a series of reflections can be made and conclusions drawn.

Regarding the type of content disseminated by the universities (RQ1), institutional publications are seen to be the most frequent, since they account for about two-thirds of the total. Only one-third of the publications are functional. Therefore, it may be argued that the universities use social networks mainly as a strategic tool for positioning the institution, to the detriment of aspects related to their daily activity. Regarding the specific topics, the organizational ones are the most common, well above publications on teaching or research; contextual content and commitment are used marginally by the universities analysed. This reinforces the previous idea of using social networks for institutional positioning, with the support of teaching and, to a lesser extent, research topics.

In all regions (RQ2) the thematic blocks (institutional and functional publications) follow the general pattern previously indicated, with very minor differences. Regarding the specific topics, although the organizational theme is the most prevalent and reinforces institutional positioning, a somewhat differentiated behaviour can be noted depending on the region. Latin American universities give greater weight to teaching activity and social commitment, while those in Europe and the United States give more importance to research topics.

Likewise, each social network (RQ3) has its own particularities, although the general orientation of the contents is quite similar, with a predominance of the institutional block and organizational issues. *Twitter* is the most used social network, where some significant differences can be noted: in Latin America the topics of teaching and social commitment have greater weight, while in Europe and the United States research topics are more relevant. *Facebook* presents some statistically significant differences by region: Europe stands out for research and teaching content, the United States for organizational content, and Latin America for teaching, social commitment and environment. *LinkedIn* is the least used social network. Functional and institutional content, as well as specific themes, do not vary substantially across the regions.

Four homogeneous groups of universities have been identified according to content (RQ4): Two with a predominance of Latin American universities, one with a majority of American, and one with a preponderance of European universities. A first cluster, formed by universities mostly from Latin America, stands out for institutional content. A second group, also with a majority of institutions from Latin America, has a preponderance of functional contents, especially teaching. A third group, mainly made up of universities in the United States, where priority is given to institutional publications (on organizational topics) and with a moderate presence of functional content. And a final cluster, mainly composed of European universities, oriented towards functional content, with greater relevance to research and teaching topics.

Finally, this article proposes some specific variables and dimensions for evaluating the content strategies developed by universities on social networks, integrating diverse knowledge, developed in academia during the last decades. This will allow other researchers to use the analysis methodology in the field, which will strengthen this area of knowledge. In future research it will be relevant to apply it in other social networks, to test the variables and dimensions, and confirm their validity. In addition, this research could be complemented with other studies on the strategies of active presence and interactivity that universities develop on social networks, which will help to understand and evaluate the digital communication of these institutions on said platforms in a global manner.

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Adaptations *versus* original film premieres trends in broadband society: a comparative analysis

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Abstract

In the era of the Broadband Society, cloud journalism, and streaming, the film industry is trying to modify traditional distribution channels. The adaptation of literary classics was one of the most widespread practices to obtain well-known, quality material for new productions. The objective of this research is to understand empirically what differences are involved in industry's major production and distribution companies' choice between adapting preexisting material or creating an entirely new film, as well as the benefits of adaptations. The methodology is comparative and quantitative, consisting of collecting data on films from the five major distributors (*Universal*, *Warner Bros*, *Disney*, *Sony*, and *Paramount*) from 2010 to 2019 and analyzing variables to detect market trends related to adaptations during that decade. We observed a higher percentage of adaptations as well as correlations between adaptations and film genre, distributor and genre, adaptations and awards, awards and genre, and genre and the film's evaluation, as well as between distributor and average budget, adaptations and budget, adaptation and opening weekend box office takings, genre and profit, adaptations and worldwide box office revenues, ratings and worldwide box office takings, and awards and worldwide box office takings; however, this was not observed between adaptation and profit and the breakeven point. It is concluded that, despite the fact that the trend of using this practice has not increased in recent years, it provides a great advantage compared with debuting new intellectual property.

Keywords

Film industry; Adaptations; Films; Cinema; Film premieres; Audiovisual; Audiovisual market; Communication; Distribution; Genres; Box office; Profitability; *Universal*; *Warner Bros*; *Disney*; *Sony*; *Paramount*.

1. Introduction

Audiovisual consumption, through various media, requires constant sources of content. The film industry is a key production hub in the audiovisual field, in its various sectors. The constant creation of content, or cloud journalism (**Fondevila-Gascón**, 2010), is a key factor in Broadband Society (**Fondevila-Gascón**, 2013), which requires a high rate of delivery of creations, and provides them from increasingly numerous and adaptable media and devices.

The film industry is no stranger to this, and is trying to respond to the wave of new viewing options for consumers –nonlinear television, streaming (**Karim**, 2019), video on demand, digital platforms, or hybrid broadcast broadband television (**Fondevila-Gascón** *et al.*, 2021a)– which are added to some that were more established, such as cable television (**Fondevila-Gascón**, 2004). Given this requirement and backed by the strategic refocusing of the industry (**Von-Rimscha**; **Wikström**; **Naldi**, 2014; **Mikos**, 2017), even in China (**Díaz-Cintas**; **Zhang**, 2022), it is academically relevant to consider the type of content and narratives that may be more appropriate and profitable. At this juncture, the debate between adaptations and proprietary productions, intensified in recent years, has arisen (**Loock**; **Verevis**, 2012; **Smith**, 2017).

2. Theoretical framework

The origin of adaptations goes hand in hand with cinema, a phenomenon linked to the Industrial Revolution. Technological, economic, and cultural advances coincided with the diversification of art and the creation of cinema, inspired by *tableaux vivants*, dance, mime, photography, and theater. This phenomenon was found in the advertising catalogs for the works related to *East Lynne* (1902) –*Home again*, *abandoned* (**Elliott**; **Marsh**, 2002). Moving pictures were initially a great attraction (**Bluestone**, 1968, p. 6).

Before cinema, there were adaptations in painting, literature, theater, and music (**Alqadi**, 2015). Currently, adaptations inundate areas such as computer games (**Papazian**; **Sommers**, 2013) or theme parks (**Baldwin-Lind**, 2016), as well as radio and television (**Leitch**, 2017). Likewise, cutting-edge platforms are emerging that allow for complete immersion in an image, such as virtual reality (**Grau**, 2003). An adaptation is a work directly related to an earlier work, but without replicating it in its entirety. Normally, there is a degree of replication, but the essence of the original is maintained, that is, that the viewer recognizes that it is an adaptation of a certain work. There are many approaches to adaptation, depending on the authors: as a product (transposition from one work to another, including the possibility of changing the medium or even the genre into which the adaptation is rendered), procedure (rewriting a story with the aim of transmitting it to new generations without necessarily having a creative process behind it, such as urban or folk legends), or adaptation of the original writing (the intertextuality that the translated work maintains with the original; **Cattryse**, 1997). Likewise, adaptations (**Wagner**, 1975) can be by transposition (where the original literary text is carried over without any substantial change), by commentary (where the original text is voluntarily or involuntarily altered), or by analogy (where the resulting adaptation contains quite a few changes, and the result can be considered a different work of art). This provides one more tool for analysis and for determining what the new medium adds when reinterpreting and transforming the work (**Alqadi**, 2015).

Discussing how faithfully a book has been adapted as a cinematographic work is a common subject, as the adapted film is often considered an object of the product of its literary source (**Vidal**, 2012). Differences between the original work and the adaptation occur, just as individual interpretations of the same work differ (**Lothe**, 2000). Novels and cinema are interlinked with each other (**Cartmell**; **Welehan**, 1999), such that adapting a work in text format and in film format transforms the final result due to the language used (**López-Gutiérrez**; **Nicolás-Gavilán**, 2015). Major American film production companies opt for adaptations because they generally tend to bring in more profits (**Crane**, 2014; **Buchsbaum**, 2017). In addition to film adaptations, production companies monetize revenues through the sale of intellectual property licenses so that other companies can sell toys, computer games, or apparel featuring the characters in the film and the universe created for the film (**Hutcheon**, 2006). Film production companies value this monetization factor (**Seger**, 1992).

One of the main uses of adaptation is to enable the viewer to form an opinion of past society (**Mee**, 2017). The viewers can compare it with the current context and project it into the future (**Sanders**, 2016), considering that stories from the Victorian era sometimes repeat themselves (**Boehm-Schnitker**; **Gruss**, 2014); it was an era that criticized the morality, discipline, and prejudices of society, adapting and changing the perspective, denouncing injustices (**Gutleben**, 2001). Producers nowadays take into account the viewers' opinion on the topics that they are addressing, such that the audience often co-creates the work (**Bowler**; **Cox**, 2009).

As a result of the audience's power, the producer can understand their tastes and preferences about one genre or another. Period cinema, which evokes nostalgia from the historical facts of the plot or the setting of the scene, pictures and paintings, and literary sources, stands out (**Vidal**, 2012). Period cinema is the cornerstone of historical cinema, based on documented historical sources and adaptations of the classics. It is common to fall into the trap of thinking that costume films gather historical facts to denounce previous events. On the contrary, these events are used as a secondary environmental framework for the main plot of a work. Critics of period cinema point to an esthetic excess and an inauthenticity of the representation of the past since it does not fit the realities of the time (**Monk**; **Sargeant**, 2002). Often the scenes are different from those of the original.

One indicator in film adaptations is the budget, since a novel can be written by a single person with minimal equipment. The three options are adaptation with a sufficient budget, adaptation without a sufficient budget and without keeping as faithfully to the original work, or an outright lack of budget (**Camarillo**, 2014). The budget is one of the factors that can determine how a film is created and is rendered on the big screen. If the budget is a limiting factor, the filmmaker can have an influence by making decisions that may or may not be aimed at providing a product faithful to the original (**Gaffney**, 1981) and avoiding stereotypes (**Fondevila-Gascón**; **Rom-Rodríguez**; **Santana-López**, 2015), depending on the point of view (who tells the story and how they tell it, what the focus of the story is, the characters, or the environment) and the tone (what values and emotions the film conveys). The scriptwriter is important since they convey a story through dialog and narration. In the case of adaptations, screenwriters are in charge of modifying and adjusting the language of the work to the medium to which it is to be adapted (**Sinyard**, 1986).

However, changes in the presentation of the final product may be dependent on artistic decisions. Films should be considered cinematographic variants of the written work, which is simply communicated in a cinematic way, since they belong to another medium featuring a much more visual type of communication than its predecessor (**Lothe**, 2000). This is how it goes throughout the history of cinema (**Dudley**, 2000). Works of classical literature inspired movie studios, which turned to renowned literary adaptations and achieved box-office successes. Thus, using literary classics to create films not only made them easier to market but also showed audiences, who are currently more interested in social media comments (**Fondevila-Gascón** *et al.*, 2021a; 2021b; 2021c), a new way to experience classic works (**Mooney**, 2021).

The purpose of this research is to analyze whether a film based on a classic work or intellectual property (IP) that has some fame and a popularity base has an advantage in terms of market positioning and profitability, based on several quantitative variables, compared with a new intellectual property, regardless of whether the final adaptation has been reworked. It should be taken into account that film belongs to a different medium, with different rules. Even in genres such as children's films, there is often a concerning lack of interest in detail, perhaps because of the limited attention that critics pay to such films or the permissiveness of the target audience (**Davis**, 2009).

Reflecting on the importance of the final product's being faithful to the original work, we address the value of adaptations compared with original material. Once the source material has been created, all that can be done with it is to adapt and recycle it over and over again, without adding any value to the original (**Smith**, 2009). Though adaptations that deviate from the literary work are not faithful, those that do not innovate are seen as unambitious, unoriginal, and without literary value. So why adapt?

The act of adapting literature endows the final version with an intrinsic value through the appreciation of the work and the dissemination of new interpretations of it (**Anushirvani**; **Alinezhadi**, 2016), going beyond the copyright (**Varian**, 2005). **Anushirvani** and **Alinezhadi** use the adaptation of *The great Gatsby* to explain that, despite incorporating a large number of elements from the novel into the film, the sensations at the end of the book or novel are different, which may be part of the director's ultimate intention. Making adaptations of a work does not devalue the literary classic or the recent adaptation; on the contrary, it recognizes their value and historical contribution to popular culture (**Chagas**, 2013).

These constant changes in the adaptations involve evolution of and alterations to the final result with each new adaptation, although they can also be viewed as differences from the original work that can undermine the adaptation. In this sense, **Chatman** (1980) argues that the accelerated pace of movies detracts from the experience considerably. Films that prioritize transposition over interpretation may fail (**Cartmell**; **Whelehan**, 1999). Adapting is not mirroring what can be read on the pages on the big screen but rather transmitting ideas by using the cinematographic language itself, providing value and a new way of expressing it in an audiovisual environment (**Geraghty**, 2007). Novel and cinema have evolved uniquely (**Hollands**, 2002; **Elliott**, 2003). Hollywood often acts as a magnet for international films reimagined in an American context (**Verevis**, 2017), quite apart from the personal learning factor (**Girardi**, 2013) in terms of the critical thinking that allows us to form our own opinions.

The adaptation–new creation dichotomy is important when it comes to film production, driven by the industry's increased demand for content.

3. Methodology

The research is comparative in nature (whether film production companies use or do not use adaptations) and uses quantitative techniques. Data from online film industry databases were analyzed. Once this information was collected, it was subjected to relevant variables that would allow an objective answer to the given hypothesis.

The primary data source for information on these variables was *Internet Movie Database* (*IMDb Pro*), one of the largest databases on the Internet, which collects information on more than 10.1 million titles from the film, television, video game, and streaming content industries. The variables analyzed are based on this source, agreed upon by the industry sector. Once all the information had been obtained and the database had been created, the *SPSS* statistical program was used to cross-reference the various variables to answer the questions posed and identify market trends.

The database used in this research is our own, based on information obtained from more generalized online databases. It synthesizes a series of variables (adaptation or new intellectual property, year and season of release, and operational return on investment [ROI]) relevant to the parameters of a film's success at the box office.

With the objective of obtaining a sample of sufficient size and in an appropriate time period to show market evolution, the market segment analyzed –of an international nature– is the operations of five of the most important film production companies in the time period 2010-2019. With this sample, we will obtain information about variables on more than 600 films (*n* = 653) over a 10-year period, which can be considered a sample of sufficient size to be representative of the film industry.

The variable that acts as the central axis of the research is that which identifies the films as adaptations or new intellectual property (IP). Since the objective is to identify whether being based on a previous work is really a strength for a production, the most effective way to check this is to relate this variable to the rest. This study also has the scope to answer secondary questions that may arise as we identify trends that have developed over the last decade when cross-correlating these variables and that may add or detract from whether a film is an adaptation.

Furthermore, this analysis is limited by the fact that it is not possible to know the marketing budget of a film. This is particularly damaging, since advertising investment is a major factor in a film's box office takings, an indicator that determines whether it will be successful in theaters. This implies an opportunity cost in terms of correlating variables that could provide relevant metrics, such as the increase in ROI based on such investment, or whether production companies consider it necessary to invest more or invest less in films depending on whether they are adaptations. As this information is not public, no interpretations can be made based on it. In addition, we must exclude isolated cases that may not be representative of the database sample. For example, we ruled out collecting information on singularities such as *Marvel*'s films, since it would be unreliable to tie their box office results to the fact that they are adaptations, as their success is largely due to the social phenomenon created by all the films from this production company.

Finally, it is necessary to define what the authors consider to be an adaptation in this study, since this is the only variable that may be subject to interpretation. First, we must note that we have identified three types of adaptations (from most to least faithful): transpositions, commentaries, and analogies (**Wagner**, 1975). In this study, works that can be considered analogical (having a source of inspiration but great creative freedom) will also be considered adaptations, since what we want to demonstrate is that the mere fact of starting from a known source (and therefore most likely sharing setting, scenarios, characters, or story) positively influences the success of a film, without necessarily implying a high level of faithfulness.

4. Results

4.1. Correlations of adaptations produced in the decade 2010-2019

Data were collected for 653 films in the period between January 1, 2010, and December 31, 2019 (Graph 1). The average annual film production during these 10 years remained relatively constant, with notable peaks in 2011, 2015, and 2016 and a slight decline in 2019.

However, we can see that the adaptations did not follow a specific pattern (Graph 2). Of particular note were 2016 and 2018, which exceeded 40 adaptations in total. The average number of adaptations produced was around 35 releases per year, but it did not show any relationship with years of release. The total number of adaptations slightly exceeded that of new intellectual property. Of the 653 total films analyzed (titles such as *Leap Year*, *The Dilemma*, *Contraband*, *Mama*, *Ride Along*, *Blackhat*, *Hail, Caesar!*, *Split*, *Insidious*: *The Last Key*, or *Glass*, to cite one per year of the sample), 341 were classified as adaptations and 312 as non-adaptations. In total, in the decade 2010-2019, 52.2% of the films that were released were adaptations.
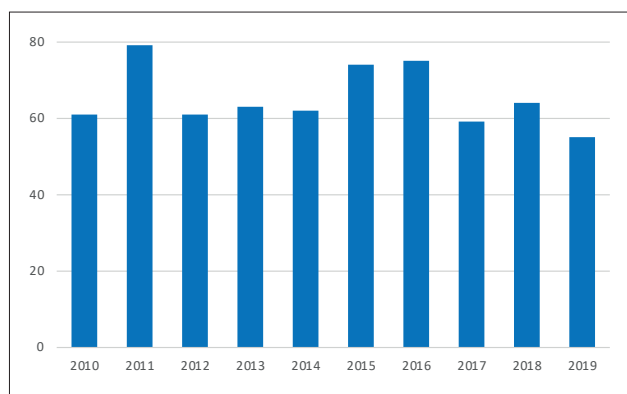
Graph 1. New films released by year
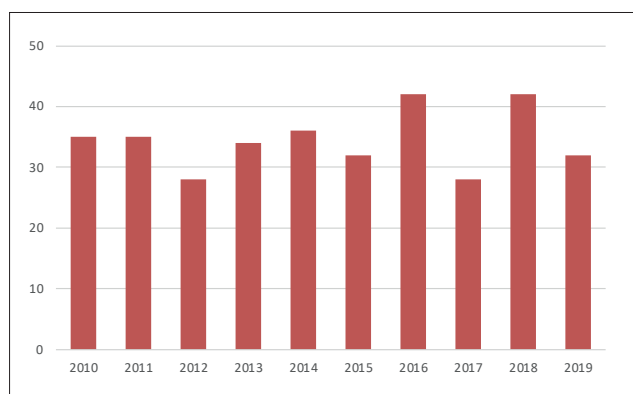
Graph 2. Adaptations released by year
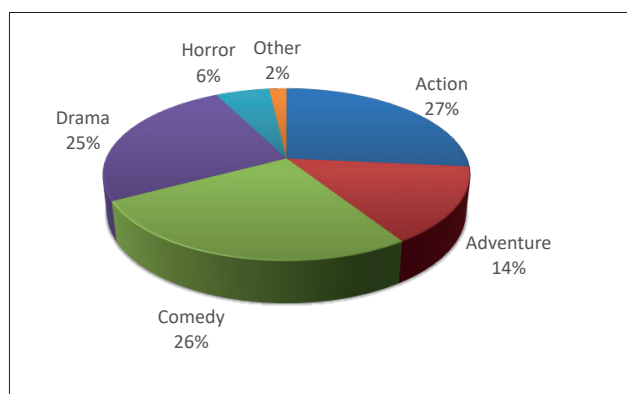
Graph 3. Film genres

The decade's most popular film genres (Graph 3) were action (26.5%), comedy (26.3%), and drama (25.3%), followed distantly by adventure (14.4%) and horror (5.7%). To determine whether the variables of adaptation and genre were related to each other, these two qualitative variables were crossed in a chi-squared test, in which it was determined that these variables were indeed related (X^2 = 49.64; p < 0.0001), with action, adventure, and drama being adapted most often.

Table 1. Genre *versus* adaptation

		Action	Adventure	Comedy	Drama	Horror	Other
Is the film an adaptation of preexisting material?	Yes	114	56	60	96	9	6
	No	59	38	112	69	28	6

The genres most likely to be adaptations of preexisting material were action, adventure, and drama. The film genres most likely to be new intellectual property were comedy and horror (Table 1).

The chi-squared test between the variables adaptation and distributor showed that they were independent of each other (p > 0.05). Therefore, we determined that whether a film is an adaptation does not depend on the distributor from which it originates. The same result was obtained (p > 0.05) when cross-correlating the variables adaptation and benefit.

Table 2. Genre *versus* distributor

Film distributor by genre		Action	Adventure	Comedy	Drama	Horror	Other
Universal Studios	n	44	18	66	32	14	6
	%	25.4%	19.1%	38.4%	19.4%	37.8%	50.0%
Warner Bros	n	66	18	37	49	14	3
	%	38.2%	19.1%	21.5%	29.7%	37.8%	25.0%
Walt Disney	n	8	44	7	11	0	0
	%	4.6%	46.8%	4.1%	6.7%	0.0%	0.0%
Paramount Pictures	n	52	14	29	17	9	2
	%	30.1%	14.9%	16.9%	10.3%	24.3%	16.7%
Sony Pictures	n	3	0	33	56	0	1
	%	1.7%	0.0%	19.2%	33.9%	0.0%	8.3%
Total	n	173	94	172	165	37	12
	%	100%	100%	100%	100%	100%	100%

There was some association between a film's distributor and the genre to which the film belongs. Having anticipated values less than 5, the conditions for a chi-squared test were not met. However, a certain pattern of association was observed. In the case of *Universal Studios*, comedy and horror productions stood out, and in the drama genre, it was lower than the amount anticipated (i.e., the proportional figure attributable a priori). *Warner Bros*, on the other hand, specialized in action films, where it was well ahead of expectations, and it was also more likely to distribute horror films. In the case of *Walt Disney*, it clearly specialized in the adventure genre, leaving aside all other genres without exception. *Paramount Pictures* also exceled much more prominently in the action genre than expected. Finally, the studio *Sony Pictures* stood out for participating in the distribution of comedy and drama films (Table 2).

Table 3. Adaptation *versus* awards

Is the film an adaptation of preexisting material? *versus* no. of times the film won an award	n	Average of the range
Yes	311	323.73
No	290	276.63
Total	601	

Table 4. Awards *versus* genre

N. of times the film won an award *versus* genre of the film	n	Average of the range
Action	152	289.48
Adventure	92	337.91
Comedy	158	252.38
Drama	156	353.80
Horror	33	250.38
Other	10	248.00
Total	601	

We also found a correlation between being an adaptation and the number of times the films received awards. The results of the Mann-Whitney U test (z = 3.34; p = 0.001) showed that adaptations (see "Average of the range" column) benefit from receiving more awards than new creations (Table 3).

The correlation between the number of awards a film receives and the genre to which it belongs was tested ($X^2_{Kruskal-Wallis}$ = 35.86; p < 0.0001). The genres most likely to receive awards from the institutions were drama, followed closely by adventure and, significantly behind that, action. Finally, the genres least likely to receive awards were comedy, horror, and the rest of the genres analyzed (Table 4).

Table 5. Ratings

Mean user rating	Statistic
Mean	6.542
Median	6.500
Standard deviation	0.89
Minimum	1.6
Maximum	8.8
Range	7.2
Interquartile range	1.2

Table 6. Ratings *versus* genre

Mean user rating *versus* genre of the film	n	Average of the range
Action	173	307.82
Adventure	94	364.56
Comedy	172	275.77
Drama	165	416.79
Horror	37	183.73
Other	12	250.75
Total	653	

Finally, the Kruskal-Wallis test also determined that there was a relationship between the genre of the film and the mean user rating ($X^2_{\text{Kruskal-Wallis}}$ = 78.99; $p < 0.0001$). Of the 653 cases, the mean score was 6.62 points, with the median being 6.50 points and the mode 6.20 (Table 5). The highest rated genre was drama, far exceeding the rest. After that, we found adventures and, far below that, action, comedy, and the rest of the genres studied. The genre that was least likely to receive awards was horror (Table 6).

4.2. Impact of adaptations at the economic level

Regarding adaptations and economic impact, there was a correlation between the film distribution company and the average budget ($X^2_{\text{Kruskal-Wallis}}$ = 159,59; $p < 0,0001$). *Sony Pictures* was the company that, on average (according to *IMDb* data), allocated the lowest budget to the films it distributed, averaging three times less than the next lowest budget, *Universal Studios*. It is followed by *Warner Bros* and *Paramount Pictures*, which are very close to each other. *Walt Disney* was last due to animated films' high cost of production (Table 7).

With respect to whether being an adaptation influences the budget allocated to the films, the correlation between these two variables was also demonstrated ($z = 6.48$; $p < 0.0001$). Production companies allocated, on average, 60.8% more budget to adaptations than to original productions (Table 8). The relationship between being an adaptation and opening weekend box office takings ($z = 2.65$; $p = 0.008$) was also confirmed, with a box office difference of 13% favoring adaptations over original productions (Table 9).

Regarding the impact of adaptations on film profits (Graph 4), for 85.9% of the films analyzed, final box office takings exceeded their budget, so these films can be considered to generate profits, albeit without considering marketing expenses, which were unknown. However, it was determined that there was no relationship between adaptations and exceeding the breakeven point ($z = 1.60$; $p = 0.110$). A total of 86% of adaptations generated profits, and 85.8% of original productions also generated profits, a difference that was insufficient to identify a correlation between these two factors.

Table 7. Distributor *versus* budget

Film distributor *versus* film budget	n	Average of the range
Universal Studios	176	304.93
Warner Bros	186	350.11
Walt Disney	70	446.83
Paramount Pictures	123	340.09
Sony Pictures	75	91.58
Total	630	

Table 8. Adaptation *versus* budget

Is the film an adaptation of preexisting material? *versus* film budget	n	Average of the range
Yes	328	360.58
No	302	266.53
Total	630	

Table 9. Adaptation *versus* opening box office takings

Is the film an adaptation of preexisting material? *versus* opening weekend box office takings	n	Average of the range
Yes	338	342.06
No	308	303.13
Total	646	
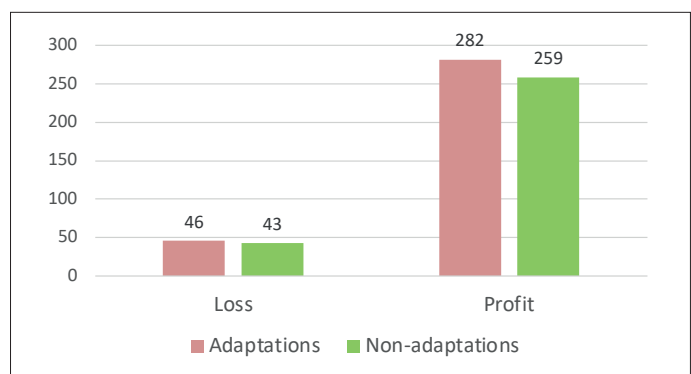
Graph 4. Profit-making films: adaptations and new IP

Table 10. Adaptation *versus* ROI

Is the film an adaptation of preexisting material? *versus* ROI	n	Average of the range
Yes	328	304.38
No	302	327.58
Total	630	

In response to the question of how much more adaptations could earn than original productions, we found that original productions earned, on average, 7.8% more than adaptations (Table 10), although when cross-correlating these variables, no significant difference was observed ($p = 0.110$).

> " The genres most likely to receive awards from the institutions were drama, followed closely by adventure and, significantly behind that, action "

Table 11. Genre *versus* profits

Profits		Action	Adventure	Comedy	Drama	Horror	Other
Loss	n	18	5	29	34	1	2
	%	10.4%	5.3%	17.5%	22.7%	2.7%	20.0%
Profit	n	155	89	137	116	36	8
	%	89.6%	94.7%	82.5%	77.3%	97.3%	80.0%
Total	n	173	94	166	150	37	10
	%	100%	100%	100%	100%	100%	100%

With regard to the genre to which the film belonged and whether it generated profits (Table 11), a pattern of association was observed, but we could not carry out a chi-square test, as conditions for this test were not met –the anticipated values were less than 5. Action, adventure, and horror films were the ones that most frequently bring in profits. On the other hand, comedy and, above all, drama were the ones that would most frequently lead to losses.

As for the relationship between adaptations and domestic and worldwide opening box office takings (Table 12), there was a trend that persisted throughout the three box office variables, whereby, on average, adaptations unequivocally grossed more than new IPs. There is a correlation between adaptations and the box office takings achieved during the opening weekend ($p = 0.008$). On average, adaptations grossed 45.6% more than non-adaptations on the opening weekend.

Table 12. Adaptation *versus* domestic box office takings

Is the film an adaptation of preexisting material? *versus* the film's domestic box office takings	*n*	Average of the range
Yes	337	345.94
No	309	299.03
Total	646	

Table 13. Adaptation *versus* worldwide box office takings

Is the film an adaptation of preexisting material? *versus* the film's worldwide box office takings	*n*	Average of the range
Yes	341	353.30
No	311	297.11
Total	652	

Continuing with this trend, a stronger correlation than in the previous case was detected between adaptations and domestic box office takings ($p = 0.001$). Adaptations show 33.9% higher profits on average.

Finally, the highest relationship of all cases was observed between the variables adaptation and worldwide box office takings ($p < 0.0001$). On average, adaptations grossed 36.5% more at the international level (Tables 13 and 14).

Table 14. Box office test statistics

	Opening weekend box office takings	Film's domestic box office takings	Film's worldwide box office takings
Mann–Whitney *U* test	45,779.000	44,504.000	43,886.000
Mean of box office takings	26,329,176.64	84,560,282.59	217,114,583.50
p (sign.)	0.008	0.001	0.000

On average, adaptations grossed 59.2% ($30.9 million) in the opening weekend, whereas new productions grossed 40.8% ($21.3 million). The average domestic takings of the adaptations was $96.3 million; that of the non-adaptations was $71.8 million. Finally, the average worldwide box office takings for adaptations was $248.9 million, whereas that of non-adaptations dropped to $182.2 million (Graph 5).
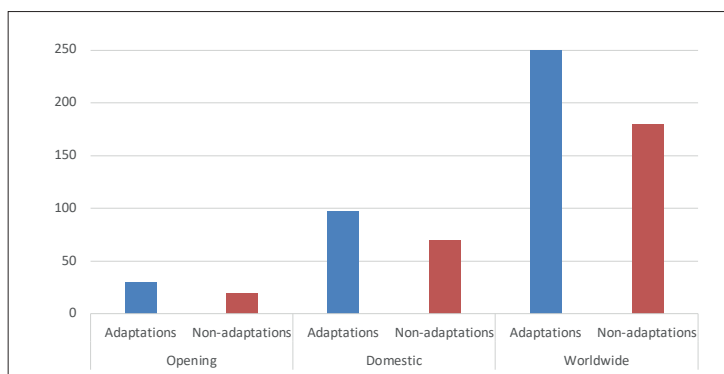
Graph 5. Average gross box office takings (in millions of dollars)

Table 15. Correlation between ratings and worldwide box office takings

		Mean user rating	No. of times the film won an award
Film's worldwide box office takings	Spearman's rho	0.137**	0.246**
	Sig. (bilateral)	0.000	0.000
	n	652	600
Mean rating received from users	Spearman's rho		0.645**
	Sig. (bilateral)		0.000
	n		601

** Significance <0.001

A correlation between the variables ratings and worldwide box office takings was also observed (r = 0,137; p < 0.0001). Spearman's test showed a significant positive, albeit weak, correlation between the two variables. When a film's rating increases, its worldwide box office takings also increase (Table 15).

We observed very similar results with the variables awards and worldwide box office takings. In the ratio test, we were able to observe a significant (r = 0,246; p < 0.0001) and positive correlation between the two variables, which on this occasion was slightly stronger than in the previous case. The greater the awards a film receives, the greater the film's worldwide box office takings (Table 15).

5. Discussion and conclusion

The main objective of this research was to analyze the benefits that a film adaptation can bring through various film distribution companies' results during a specific period of time (2010-2019). Previous research (**Bowler**; **Cox**, 2009; **Fondevila-Gascón** *et al.*, 2021b; 2021c) had attributed advantages to adaptations, such as the relevance and popularity of their literary matrix and their

> " The current situation stems from the predominance of North American production, although the growing demand for content is causing an expansion to other countries "

dissemination on social networks, as well as the budget's determining role in the final result (**Cattrysse**, 1997; **Camarillo**, 2014). Similarly, this stems from the predominance of North American production (**Crane**, 2014), although the growing demand for content is causing an expansion to other countries (**Buchsbaum**, 2017).

The present research supports previous findings and perceptions with quantitative data, so that adapted films are attributed with an inherent advantage over productions that start from scratch. In terms of production, so often metrically analyzed in Broadband Society (**Fondevila-Gascón**, 2013) and required in concept of cloud journalism or content flow (**Fondevila-Gascón**, 2010), we observed that adaptations did not follow an exact trend in rate of production, although this was stable throughout the period covered (2010-2019). Neither was there a much higher number of adaptations than films that started from scratch, although they were a slight majority of all films released in this period (52.2%). Some genres tend to be adapted more than others, with action, adventure, and drama at the forefront.

The five distribution companies analyzed (international leaders in the sector) tended to favor one or several genres, and they produce films from these genres more frequently than the others. *Disney* stands out in particular, as it focuses on the adventure genre over all others. This genre is not related to adaptations, with profitability being prioritized over of the creative core of production.

In this line, these trends were not related to the possible generation of return on investment, since 85% of the films achieved profits, with no apparent relation to the genre to which they belonged. The industry can be seen as utilitarian, interpreting that there is no strategy to promote one type of production or another but rather that results take precedence. This has gone beyond other findings, such as the fact that adaptations have won more awards than new productions. Additionally, the number of awards received and the average rating obtained by the films according to their genre have been increasing: comedy, drama, and adaptation were the most awarded and highest-rated genres.

From an economic perspective, adaptations have major advantages over new intellectual property. Films based on adaptations received on average a 60.8% higher budget than non-adaptations. On the contrary, no significant differences re demonstrated between the adaptations and whether they achieved profits or the return on investment achieved.

However, in net box office takings, the adaptations obtained significantly higher profits in the three types of box office takings measured. Domestic box office takings were the least marked (a not inconsiderable 33.9% more profit than new productions). In worldwide box office takings (36.5% higher) and opening weekend box office takings (45.6% greater), the trend was confirmed. Thus, in

> " The industry can be seen as utilitarian, interpreting that there is no strategy to promote one type of production or another but rather that results take precedence "

the opening weekend, on average, adaptations grossed $9.6 million more than their non-adaptation counterparts. In domestic box office takings, they grossed $24.5 million more, and in international box office takings, $66.7 million more. It follows that the film industry, in the interest of obtaining more profits, should intensify its commitment to adaptations. This is a contribution of knowledge transfer that stems from the present research, and that can illuminate changes in trends in the types of film production.

> From an economic perspective, adaptations have major advantages over new intellectual property. Films based on adaptations received on average a 60.8% higher budget than non-adaptations

Finally, a significant correlation was also observed between the variable adaptation and the variables score and rewards, although in both cases the correlation was weak. In general, the higher the box office revenues, the better the films were rated and the more awards they received.

As limitations of the research, the selected cohort can be expanded, and in addition, specific data on investments inherent to film productions, such as marketing resources, can be incorporated. This would shed light on possible future lines of research, both geographically (analyzing data by country and continent, even comparatively) and over time (tracking the same variables every decade, for example).

In short, adapting a preexisting literary material offers advantages for film production companies when it comes to considering an adaptation intellectual property created from scratch. Not only are there clearly greater economic benefits, but adaptations tend to be more rewarded and better valued, which can positively influence adaptations retroactively. If this is combined with a strategy whereby the production company specializes in a certain film genre, optimal results are obtained. In terms of industrial knowledge transfer, it is recommended that film production companies adapt preexisting literary material that has achieved a certain level of impact, as it will be profitable in the most tangible indicators.

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The use of QR codes to fuel transmedia strategy in the ecosystem of audiovisual media groups

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Abstract

The QR code (from the English *quick response code*) is a type of two-dimensional bar code that, when scanned, directs you to an internet site. Audiovisual groups, as part of their hybrid strategies and digitization actions, incorporate it into their television programs to provide them with interactivity and improve participation and engagement with their viewers. In this article, a radiography of the audiovisual ecosystem in Spain is created to show the use of this technology in linear television broadcasts and its impact. The methodology used for this is mixed: semi-structured in-depth interviews (with heads of this strategies from the 3 audiovisual and multimedia groups in Spain) and an analysis of its use in 150 news programs to find out the functions and themes for which it is used, and the frequency of QR codes used in television broadcasts. The results of this work are illuminating since, despite detecting very different degrees of use in each channel, high interest and actions to implement them are detected by all of them, both in the news and in other programs. As the most relevant conclusion, we observe that audiovisual groups create a digital ecosystem to generate a transfer of viewers between television born before the Internet and its new digital media, generating a great impact of digitization in the transformation of the media.

Keywords

QR codes; Audiences; Television; Media; News; Internet; Prosumers; Interaction; Viewers; Transmedia; Technologies.

1. Introduction: QR codes and media

1.1. The QR code

A quick response (QR) code is a type of two-dimensional bar code consisting of a matrix of dots whose appearance is easily identified by its square shape and the three squares located in the upper and lower right-hand corners. Although several types of QR codes have been developed –such as the Micro QR code, a mini version for small spaces, or the rectangular rMQR code for narrow spaces– QR Code models 1 and 2 are the most popular ones, and we see them on a daily basis. These are the types of QR codes on which this paper focuses.

The QR code was created in 1994 by the Japanese corporation *Denso Wave*, a manufacturer of automotive components, as a solution for its need to expand the information storage capacity and improve the reading speed of traditional barcodes (*QRcode.com*, s.f.). These benefits, coupled with the fact that the corporation did not exercise its right to charge for the patent, have helped its use to spread worldwide.

There are four key dates related to mainstreaming the use of QR codes and their proliferation: 2000, 2002, 2012, and 2020. The first, 2000, is the year they were approved as an international standard (*ISO/IEC18004*) with open source and free use. In 2002, cell phones began to include a QR code reading function, making them easier for the public to use. In 2012, they received the international *Good design award* from the *Japan Institute of Design Promotion* for their ease of use and versatility. Starting in 2020, coronavirus and the low-contact economy succeeded in popularizing them through their use, for example, in the digitalization of restaurant menus (**Delgado**, 2020). This popularization was reflected in the fact that the percentage of internet users who used QR/*Bidi* codes on smartphones or tablets increased by 50% over 2 years (from 53.2% in 2019 *versus* 77.7% in 2021) (*AIMC*, 2022).

Generating a QR code is a very simple process, right at the fingertips of anyone with a computer, cell phone, or tablet. In the *Chrome* browser, for example, the user simply goes to the page that they want to share and right-clicks to access the "Create QR Code" option for the page. They can then choose to copy the QR code link, click to download it, or scan it with another device's camera (*Google Chrome*, s.f.). Once created, anyone with a camera can scan it and access the page in question. This ease of creation has also been a key element in the spread of its use.

There is another variant of the QR code called the *Bidi* code. This has been the property of *Movistar* since 2008, but unlike the QR code, it is private and not free (**Estrella-Ramón**; **Segovia-López**, 2016). As a result, its use is much more restricted, and it is more frequently used for commercial purposes; this indicates that it will have less chance of surviving in the long term, whereas the QR code will prevail.

1.2. The QR code in Spain

In Spain, one of the QR code's earliest public appearances was in 2012 when the Minister of *Finance and Public Administrations*, Cristóbal Montoro, delivered the *General State Budget* through a QR code. This allowed the full content of the budget to be downloaded directly from the *Ministry of Finance*'s web portal using a smartphone, which in those days was cutting edge. "QR code" ["*código QR*"] was a trending topic on *Twitter* that day. In previous years, budgets had been delivered on a flash drive, accompanied by a CD-ROM and the classic *Yellow Book* [*Libro Amarillo*] summary of the public accounts (*Ministry of Finance and Public Function*, 2012).

Since that date, the evolution of this technology's use in Spain has accelerated exponentially, from 35.2% in 2013 to 77.7% in 2021, as can be seen in Figure 1. From these numbers, it is clear that this technology is present in a wide variety of activities today. At a personal level, it can be seen in a wide range of printouts, brochures, identification cards, and products for personal use, etc. At the commercial level, it is an indispensable tool in tasks such as logistics, services,

manufacturing, and sales. Among the trends predicted to be key in digital business in 2022, *IAB Spain* (2022) mentions the rise of the QR code, and positions it as a tool through which the user can take an interest in a particular product and obtain more information about it, or even share it on the spot.

The hospitality sector has been a major driver of QR code use: The main activity carried out with QR codes is viewing a menu at a bar/restaurant (55.8%). This is followed by accessing extensive information about something (27.8%) and downloading a coupon (27.4%). Other less frequent uses are connecting to a Wi-Fi network (22.3%) and accessing an event (18%) (*IAB Spain*, 2021).

Figure 1. The evolution of QR technology in Spain (2013-2021). Source: *AIMC* (2022)

1.3. The QR code in the media in Spain

The Internet has revolutionized the way we access the media. Reading the electronic edition only of a newspaper is already at 55.3%, listening to online radio is at 30.6%, and watching television online is at 42.1%. It is no longer surprising to see figures such as 34% having watched television networks' prerecorded broadcasts online in the last 30 days and 36.2% having watched their live broadcasts (*AIMC*, 2022).

An evolution in the media has taken place in parallel to –and owing to– this technological evolution in recent years; this has helped to elucidate the common direction of these codes, as well as their impact on digitization and transformation. Not only the media but also journalistic brands have worked hard and agilely adapted to survive and grow in a highly competitive digital environment by reacting quickly to changes in their environments and keep pace with the digital transition. This is even more true of the traditional Internet media, on which this paper focuses, which have managed

to carve out a very respectable niche for themselves among the purely digital native media that were designed for the online environment (**Negredo-Bruna**; **Kaufmann-Argueta**, 2021).

In a ranking of the weekly reach of both types of media outlets (digital natives and the main traditional media online), the online version of the traditional media outlet *El País* takes first place with 18% (use in the last week), whereas the digital native *OKdiario.es* lands in second with 13%. The media outlets that are included in this study occupy very interesting positions: *Antena 3* online appears in third place with 13%, *Telecinco* online in 14th, and *RTVE* online in 15th position with 8% (**Vara-Miguel** *et al.*, 2022). These positions show that their efforts to adapt to the digital world are paying off.

This convergence makes it possible to unite two concepts thus far opposed: the physical world –traditional media's base– and the digital world –the Internet and social networks– with the meeting point between the two being the cell phone terminal. This symbiosis between both worlds –the only choice available– has occurred naturally out of the necessity to adapt to the convergent audience, as a consequence of both the evolution of media consumption and transmedia content (**Scolari**, 2014) and that of mobile device consumption, a world located in that third environment as described as early as 1999 (**Echeverría**, 1999).

The news media have always been of a transmedia character, enabling consumer participation in their programs either through mail in the past or through digital media such as social networks today. Therefore, it can be said that QR codes are an ideal ally, allowing content to be expanded upon and delved into in a way characteristic of the transmedia principles of **Jenkins** (2009).

Applied to the news media, this promotes deeper levels of audience engagement and loyalty. For example, content is developed from a transmedia script, where all links are set up so that all the fragments have a cognitive relationship while remaining complementary and not repetitive (**Grandal-Ayala**, 2017). This can also be understood through the concept of migration cues of **Ruppel** (2006), who proposes the use of visible signals within a text that lead to content on other channels. These are defined as narrative paths that are marked by an author so that they can be located by a user through different activation patterns. These cues are not only the means by which narrative is composed but also the blueprint by which an ideal reader becomes a consumer of texts.

In journalism and the new media ecosystem (**Canavilhas**, 2013), these technologies break through to create a fluid medium (**Bauman**, 2007) and a culture of convergence that blurs the boundaries between media, encouraging physical media to offer their content in various forms and mediums so that the viewer can interact with them (**Jenkins**, 2006). This convergence allows the media to strengthen consumer loyalty, boost their participation and sense of belonging to a community, and even achieve content immersion (**Parra-Valcarce**; **Edo-Bolós**; **Marcos-Recio**, 2017).

The use of QR codes on television indicates that its consumption is intermingled with the use of second screens. For example, **Weimann-Saks**, **Ariel** y **Elishar-Malka** (2019) conclude that television viewers of major sporting events (such as the *World Cup*) prefer to watch or comment on them together via *WhatsApp*, without physical presence being necessary. Along the same lines, there is other research linking the viewing of series on television with impulse purchasing on second screens (**Vázquez** *et al.*, 2020). However, this second screen phenomenon is a complex process that depends on variables such as the viewer's affinity with the programs, their motivations, or interpersonal interaction (**Guo**, 2019). There are also specific applications on cell phones designed for certain television programs that enhance the interactivity and social experience if the genre is appropriate (**Vanattenhoven**; **Geerts**, 2017).

Traditional journalistic genres are in the midst of a metamorphosis, and the change has not yet become ingrained, whereas the media seek a recipe for success through journalistic innovation (**Costa-Sánchez** *et al.*, 2019). One of the keys to this metamorphosis lies in the palm of our hand –the cell phone– which is notable for being a second screen used while watching television: 60% of users habitually use them simultaneously. They use it for chatting (77%), social networks (71%), and email (69%), while 53% of them use it to check news (*IAB Spain*, 2021). Second screens encourage television viewers to engage in transmedia consumption according to their interests: entertainment or searching for information (**Albarello**, 2016). To update Sella (cited by **Jenkins**, 2006), a person with a television is condemned to isolation, but a person with a television and a cell phone has access to a world without limits and belongs to a community.

Table 1. List of programs analyzed

Channel	Audiovisual media group	Program name	Broadcast schedule	Screen share and average audience in June (*Barlovento Comunicación, 2022*)
La 1	*RTVE*	*Telediario 2* [*News Bulletin 2*] *Telediario Fin de Semana* [*Weekend News Bulletin*]	Monday-Friday at 9 p.m. Saturday-Sunday at 9 p.m.	9.7% 1,041,000
Antena 3	*Atresmedia*	*A3 Noticias 2* [*A3 News 2*] *A3 Noticias Fin de Semana* [*A3 Weekend News*]	Monday-Friday at 9 p.m. Saturday-Sunday at 9 p.m.	20.7% 2,158,000
Telecinco	*Mediaset*	*Informativos Telecinco Noche* [*Telecinco Nightly News*] *Informativos Telecinco Fin de Semana Noche* [*Telecinco Weekend Nightly News*]	Monday-Friday at 9 p.m. Saturday-Sunday at 9 p.m.	11.5% 1,203,000

The quantitative component of the methodology consisted of the collection and analysis of appearances of QR codes in the 150 episodes of the singled-out news programs over 50 consecutive days (from May 23 to July 11, 2022). During this period, a total of 50 broadcasts of the aforementioned news programs on each channel were recorded. The following variables were collected for each appearance (Figure 2):

- the date of program broadcast;
- QR code appearances;
- the text that accompanied the QR code; and
- the type of segment in which it was located.

Figure 2. Use of QR codes in news programs from May 23, 2022, on *Antena 3*. Source: Screenshot of the *Antena 3* broadcast. The caption reads "THE RELATIONSHIP BETWEEN FATHER AND SON".

For the classification of QR codes by segment, we rely on the following thematic organization of **Gómez-Rubio**, **López-Vidales** y **Vicente-Torrico** (2018):

- society and culture (the Royal House, celebrities, curiosities);
- economy (consumer issues, consumer price index [CPI], unemployment);
- events (crimes and fires, for example);
- international (the EU, events outside Spain and, mainly, the war in Ukraine);
- politics (national political issues, elections);
- sports (sports issues);
- meteorology (weather-related issues or incidents with serious consequences such as heat waves or overflowing rivers, etc.); and
- health (this final segment being added to the aforementioned classification since, after the Covid-19 pandemic, it gained enough prominence to be considered a segment on its own, independent of society and culture).

In addition, both sports and meteorology have programs independent from the news, although when a news item is sufficiently important, it becomes part of the news program.

This coding according to the categories above was initially carried out by one of the authors. Another researcher then recoded the sample. The intercoder agreement ratio using the **Holsti** (1969) method was 0.99 (where 1 indicates total agreement). These data were processed using *Excel* program, and using dynamic tables, summaries were prepared to respond to the objectives set out above.

The semistructured interviews were conducted with the top heads of digital strategy of the three television networks analyzed. The questions asked were aimed at understanding why this technology was incorporated into their programs, how long they had been in use, the results obtained in terms of website traffic, for what type of content they worked best, whether they foresaw their being used for a long time, and whether any specific audience interacted with them more than others. The name and position of the experts interviewed, along with the date and manner of data collection, are presented in Table 2.

Table 2. Semistructured interviews with heads of the three audiovisual groups in Spain

Person and position	Date	Type
Sandra Vicente, deputy director of digital content at *Mediaset*	06/15/2022	Email and instant messaging
Mónica Prado, editor-in-chief of the digital department of *Antena 3 Noticias* (*Atresmedia*)	06/20/2022	Email and instant messaging
Estefanía De Antonio García, director of digital news content at *RTVE*	07/17/2022	Email and instant messaging

The rationale behind this second method is the need to find answers to explain the data that might be identified using the first method.

4. Results

4.1. Number of QR codes from linear broadcasts by television news program

As a general result, we obtained very disparate data on the use of QR codes on the television networks studied. Very regular and frequent use was detected on the *Atresmedia* group's channel, *Antena 3*, but their use was less frequent on *La 1* and almost nonexistent on *Telecinco*.

On *Antena 3*, out of the 50 episodes studied, this format was used in more than 90%, as 46 episodes that broadcast them were found. In addition, the number of QR codes broadcast in each episode was high, with an average of three QR codes per broadcast. The other two networks studied used this format more sparingly. Only 10% of episodes of the news programs on *La 1* and 4% of those on *Telecinco* used them in the period analyzed. In addition to these modest data, the frequency was low: *La 1* had an average of 1.4 per episode, and *Telecinco* only had 1.

In terms of periodicity, several patterns can be observed, perhaps due to the frequency of this format's use. On *Antena 3*, QR codes were broadcast on 46 of the 50 days observed, leaving only 4 dates without appearances: Monday, May 30; Friday, June 3; Sunday, July 3; and Saturday, July 9. On *La 1*, they were broadcast on only 5

> Audiovisual groups create a digital ecosystem to transfer viewership between traditional television and their new digital media

dates: Sunday, June 19; Tuesday, June 28; Sunday, July 3; Thursday, July 7; and Monday, July 11. *Telecinco* had only two days with appearances, which occurred on successive days (Wednesday, June 25, and Thursday, June 26), whereas on the other dates, no QR codes were presented. All of these overall data are summarized in Table 3.

Table 3. Overall results: Episodes of news programs with QR codes and the average number of QR codes per episode of a news program

Network	Numbers of episodes of news programs with QR codes	QR codes presented	Average QR codes per episode of a news program
Antena 3	46	142	3
La 1	5	7	1.4
Tele5	2	2	1

4.2. Topics promoted using QR codes in linear television broadcasting

With respect to the analysis of the topics that QR codes were used for, the results varied according to the network. Table 4 shows the details of how each channel used QR codes for the different topics, both in absolute figures and in relation to the total.

Table 4. Topics promoted with QR codes in linear television broadcasting: number of QR codes and as a percentage for each network

Topic	QR codes on *Antena 3*		QR codes on *La 1*		QR codes on *Telecinco*	
	N	%	N	%	N	%
Society and culture	9	6%	1	14%	-	-
Economy	33	23%	1	14%	-	-
Events	25	18%	-	-	-	-
International	21	15%	3	43%	2	100%
Politics	25	18%	1	14%	-	-
Sports	5	4%	-	-	-	-
Meteorology	8	6%	1	14%	-	-
Health	16	11%	-	-	-	-
TOTAL	142	100%	7	100%	2	100%

The data obtained were disparate: In the case of *Antena 3*, QR codes were used in all the topic areas included in the classification, whereas on *La 1*, they were used in five, and *Telecinco* focused on only one.

Although QR codes were used in all topic areas by the *Antena 3* channel, some were used more than others. Four topics accounted for 3 out of 4 appearances: economy almost 1 out of 4 (23%), followed by events and politics (18% each), and international (15%). In fifth place came healthcare, which accounted for 1 out of 10 (11%). Less frequently, they were related to society and culture, meteorology, and sports.

Regarding their use in relation to the economy, on several occasions they were used in news about the increase in the price of electricity with texts such as: "Tips to understand your bill" ["*Claves para entender la factura*"], "Tips to lower your electricity bill" ["*Claves bajada factura de la luz*"], and "How to know the real price" ["*Así puedes saber el precio real*"]. In the news pieces about the increase in gasoline prices, on three occasions on different days, a QR code was provided with the text "Find the cheapest gas station" ["*Busca la gasolinera más barata*"] or "Cheap gas station finder" ["*Buscador gasolineras baratas*"]. During the *Ryanair* strike, they provided help with "How can you find out if your flight has been cancelled?" ["*¿Cómo saber si han cancelado su vuelo?*"] and "Claims for cancelled flights" ["*Reclamaciones vuelo cancelado*"]. With regard to news items about Spaniards' economic situation, the codes were used to expand upon content with texts such as "The cheapest supermarket" ["*Supermercado más barato*"], "How will we feel the VAT decrease?" ["*¿cómo vamos a notar la rebaja del IVA?*"], "What help has been approved?" ["*¿Qué ayudas se aprueban?*"], "All of the measures" ["*Todas las medidas*"], "When and how to benefit" ["*Cuándo y cómo beneficiarse*"], "Tricks to save" ["*Trucos ahorro*"], "Requirements for accessing aid" ["*Requisitos para acceder a las ayudas*"], "The data that warn of the recession" ["*Los datos que avisan de la recesión*"], and "The sectors with the highest salaries" ["*Los sectores con sueldo más alto*"], among others.

When they were used in the politics segment, it was to provide further information or images ("The complete interview" [with Aznar] ["*La entrevista completa*" *(a Aznar)*], "New images of border jumping" ["*Nuevas imágenes del salto a la*

valla"], or "The details of the event" ["*Los detalles del acto*"]), and on four occasions they were used to access parliamentary election polls in Andalusia and also to know the details of the results. On other occasions, they were used to provide the viewer with key information about a certain topic, such as the debate on the state of the nation or the transgender law.

> " QR codes on television represent a transmedia strategy to increase the online audience of audiovisual groups "

Health was a single-issue segment where appearances dealt with advice, information, and current events related to Covid-19 such as "Symptoms of the 'Centaurus'" ["*Los síntomas de la 'Centaurus'*"], "Interview: parents of the vaccine" ["*Entrevista: Padres de la vacuna*"], or "Such is the silent COVID wave" ["*Así es la ola COVID Silenciosa*"]. Monkeypox was also referred to on occasion, for example, "Guidelines to prevent monkeypox" ["*Pautas contra la viruela del mono*"].

They were always used in the meteorology segment in the context of the heat wave suffered during those dates, with forecasts on its duration, the hottest times, and advice on how to mitigate its effects with text such as "Where will it be hottest?" ["*¿Dónde hará más calor?*"] or "How long will the heat wave last?" ["*¿Cuánto durará la ola de calor?*"].

The QR codes used by *La 1* were related to five different topics. They were concentrated under the international topic (43%), and then the other four equally (14%). Within the international topic, they were used during the *NATO* summit in Madrid to launch live images ("*NATO* Summit. Live on *RTVE.es*" ["*Cumbre OTAN. En directo en RTVE.es*"]), and to provide "The key points of the summit" ["*Las claves de la cumbre*"] and "The complete interview" ["*La entrevista al completo*"] (Javier Solana), whereas under the national topic, they were used to report on the state of the reservoirs ("Reservoirs on *RTVE.es*" ["*Embalses en RTVE.es*"]) and to offer media coverage of *San Fermín* ("The 10 cameras" ["*Las 10 cámaras*"]). This network's use of QR codes was focused on redirecting the viewer to consume its resources or visit an expansion upon its audiovisual content rather than to expand upon specific information or help the citizen as *Antena 3* did.

The two QR codes found on *Telecinco* were broadcast in the international segment (100%), and both times to expand information about the war between Ukraine and Russia. They used it so infrequently that no further information could be obtained from their analysis except that they centered around two consecutive days, May 25 and 26.

4.3. Interviews with the heads of the digital strategy of the analyzed networks

Tables 5 and 6 below summarize the answers provided by the sample. Table 5 presents the rationale behind the use of QR codes on television networks and their reasoning.

Table 5. Rationale behind television business groups' use of QR codes in Spain

Person and position	Date when QR codes were first used in news content	Current topic that prompted its use	Functions of QR codes
Sandra Vicente, deputy director of digital content, *Mediaset*	March 2022	War in Ukraine	Opportunity to migrate the audience from television to the digital universe, encouraging participation in interactive actions (surveys and special activities, among others).
Mónica Prado, editor-in-chief of the digital department of *Antena 3 Noticias* (*Atresmedia*)	November 2020	Covid-19 pandemic	It is a very useful tool for all that reference information that naturally complements TV content in its digital version. The objective is to reach viewers/users with comprehensive information, covered in depth.
Estefanía De Antonio García, director of digital news content at *RTVE*	November 2020	Covid-19 pandemic	It is a way to connect our analog audience to our digital content to give added value, and it allows us to drive traffic to our platform. The function of the QR code is to offer value-added content.

The three networks concurred that the use of QR codes in television content on a regular basis is driven by an important current event: the war in Ukraine (on *Mediaset*) or the pandemic (on *Atresmedia* and *RTVE*). Sandra Vicente, at *Mediaset*, recognizes that previously QR codes were used regularly on their entertainment programs

> "mainly for interactive content, such as audience voting to make decisions on the programs";

however, with the military conflict between Ukraine and Russia, they decided to improve the audience's access to information regarding how to help Ukraine and offer the viewer constantly updated access to the latest news on the conflict.

In the case of *Atresmedia*, Mónica Prado explains that

> "as a result of the new situation caused by the pandemic, in which QR codes became a tool commonly used by the public (for example, in restaurants and bars), *Antena 3 News* decided to also incorporate them into its television broadcast to provide viewers with more comprehensive information that they could consult".

> " The themes most commonly associated with QR codes on television are related to Economics, Events, Politics, and International News "

In turn, Estefanía De Antonio explains that, at *RTVE*, they began "to implement the use of QR codes in the 2020/2021 season, initially focusing on the morning news magazine *La Hora de La 1* to provide value-added content".

Table 6. The effects of QR codes on traditional television on digital content

Person and position	Percentage increase in digital content promoted with QR codes on linear television	Will they continue with the digital strategy of using QR codes in linear broadcasting?	Content most likely to be promoted with QR codes
Sandra Vicente, deputy director of digital content, *Mediaset*	In interactive actions in primetime entertainment programs, access to the URL through a QR code can account for up to 50% of that URL's total traffic. In current actions, the data are more limited, reaching around 10% of total traffic.	Yes. Viewers are already used to accessing QR codes whenever they are interested in further information or actively participating in an initiative, so it seems that QR codes are here to stay.	Surveys, special actions, and content that complements that provided on television.
Mónica Prado, editor-in-chief of the digital department of *Antena 3 Noticias* (*Atresmedia*)	It is an indicator that is highly dependent on current events and fluctuates depending on the day and the news. It is always a very positive influx of users and visits to the *Antena 3 News* website.	Yes. The QR code is perfectly integrated into the routines of all editions of *Antena 3 Noticias* news items, as well as in other current affairs programs.	The most common in our case have to do with news from the society, national, international, and economy sectors. As long as it serves to provide extra information to that offered on television.
Estefanía De Antonio García, director of digital news content at *RTVE*	We have had difficulties in measuring cumulative audience. In real time, we have noticed an increase of between 50% and 200%.	"I think so". Because the use of QR codes has become popular in the last two years in the wake of the pandemic. I do believe that QR codes can lose their value in the sense that the audience does not understand it as a call to action, but understands it as just another label and does not interact.	Those that provide added value: questions and answers about public service issues, access to data on current affairs, and up-to-the-minute monitoring of news events.

Although this is the confidential and internal data of television companies, all the heads of the digital departments recognized that, when a QR code is placed in the traditional television broadcast, digital content increases "very positively" (*Antena 3*, *Atresmedia*), "an increase of between 50% and 200% is seen" (in *La 1*, *RTVE*), or "10% in current affairs programs" (*Telecinco*, *Mediaset*). However, the three heads claimed that this result depends on the type of QR code. *Mediaset* pointed out that QR codes in entertainment programs outperform web addresses promoted in linear broadcasting (Table 6).

As for the future use of this strategy, *Mediaset*, *Atresmedia*, and *RTVE* said that they will continue to use QR presentation in broadcasting. However, *RTVE* was not decisive in asserting that, in the future, it would be possible that viewers would get used to QR codes and no longer interact and that, therefore, "the goal is for each program to invite them to use this code".

5. Discussion and conclusions

The adoption of QR codes in television broadcasts to increase their online audience demonstrates the impact of digitalization and how the interest in growing in new markets has transformed traditional media.

This snapshot of the audiovisual ecosystem in Spain showing how QR codes are being used in linear television broadcasts highlights a very clear fact: Its implementation as part of a hybrid strategy is very heterogeneous –in terms of not only the frequency with which it is used but also the use to which it is put. Including *La 1* and *Telecinco* in the discussion of results is somewhat difficult owing to the low levels of QR codes found, in contrast to the high volume found on *Antena 3*. Upon reviewing the results from the interviews with their heads, the three media groups concurred that the QR code strategy meets the objective of migrating viewers from linear television to their digital content; the disparate quantitative results are due to the various strategies used with this format.

In *Antena 3*'s news, QR codes were fully integrated into their programs, and they were used very frequently and in a variety of ways; however, on the other two channels, they were not used to the same extent. *La 1*'s use of them in its news programs was quite reserved, focusing on specific segments, whereas *Telecinco* only used them on two occasions, which seemed more like a trial than a strategy that they had implemented. This suggests that this format is not fully developed when, in two of the three cases, it did not have a significant impact, nor was a strategy detected. This means that almost all the conclusions about the way and manner in which they are used were drawn from the network *Antena 3*'s use of this device. Although an analysis of the interviews with the heads of the three networks showed that all of them have taking QR codes into account and are working to include them as an additional resource, only *Antena 3* showed through its broadcasts that they are already in use and not a future plan.

> The interest in growing in new markets has transformed traditional media through transmedia strategies such as QR codes

Major events that have affected the world (the pandemic and the war in Ukraine) have promoted the use of QR codes as a strategy for large audiovisual media groups. With the pandemic, the use of this technology in society was boosted (Figure 1), and television networks began to implement them from then on (Table 4). Yet, with the war in Ukraine, the three networks made prominent use

> All of the digital area managers acknowledge that digital visits to their websites increase when a QR code is displayed during traditional television broadcasts

of QR codes related to this category (Table 4; the average media presence for the topic of the war in Ukraine was 52.6% on the three networks: 100% on *Telecinco*, 43% on *La 1*, and 15% on *Antena 3*).

In any case, the three audiovisual groups recognized the value of attracting viewers from traditional television to their new digital media. Programs broadcast on television maintain audiences in the millions (Table 1), and audiovisual groups take advantage of this massive viewership to migrate users to the Internet and improve their transmedia strategy. The implementation of QR codes after their increased use during the pandemic is aimed at facilitating this leap from traditional broadcasting to new mediums and enhancing their audiovisual and business ecosystem.

Regarding this hybrid strategy's impact on online audiences, the results were not conclusive either. Although networks convert television viewers into website users with these codes, it seems that there are still no reliable resources or systems to measure their real audience, which makes it difficult to measure their success. Audience data for linear programs showed web traffic data ranging from 10%, 50%, and up to 200% depending on the topic, but no specific pattern of success was detected, either by topic or by date of broadcast.

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Polarization, virality and contrary sentiments for LGTB content on *Instagram*, *TikTok*, and *Twitter*

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Abstract

Digital platforms are spaces for social participation with significant value in the development of the identity of adolescents and emerging adults. The objective is to identify the behavior and visibility of LGBT content using *Instagram*, *TikTok*, and *Twitter* posts of such content from May 16 to November 16, 2022, collecting 539,389 posts. Social media monitoring techniques gathered the posts with the keywords "LGTB" or "LGBT" in Spanish and English, forming the database. The methodology is based on a mixed design: first, the database is analyzed using Big Data techniques and, second, the 10 most viral posts from each social network are selected. The results show that dissemination of gender identity in content and meaning is uneven across the various social networks. *Twitter* profiles have a higher number of posts (61%), polarization, and lower virality and exhibit visible LGBTphobia. *Instagram* has a number of posts (37%) and average virality, with positive sentiments. *TikTok* has fewer posts (2%), less polarization, positive messages, and extreme virality. The three networks consider the *Pride* demonstrations to be a symbol of the community because they destabilize and confront LGBTphobic oppression by occupying public spaces, opening the closet without stigma or shame, as is reflected on social networks. The behavior of LGBT content on these platforms is multidimensional, uneven, and differentiated, which demonstrates the necessity of ensuring respect for the diversity of sexual orientation and gender identity on digital platforms.

Keywords

1. Introduction

Digital platforms are spaces of participation for communities that are treated unequally due to sexual orientation and gender identity, and they play a valuable role in the development of identity for adolescents and emerging adults (**Jenzen**, 2017). These platforms host information, discussions, and creative performances confronting the traditional media, which continue to represent the LGBT community in a one-dimensional and stereotypical way, ignoring many subgroups (**Fox**; **Ralston**, 2016; **Craig**; **McInroy**, 2014; **Craig** *et al.*, 2017; **McInroy**; **Craig**, 2017). This is an important issue because, as demonstrated by **Linville** and **Lee** (2010), high school students in face-to-face settings construct narratives about their experiences with lesbian, gay, bisexual, trans, and queer peers based on ethical decisions about sexuality and gender identity they seek to embody –reflective and elaborate representations that challenge stigmatizing public discourse with the reality of being queer (**Carlson**, 2014). Digital platforms can amplify and reinforce these representations and also meet the LGBT community's need for visibility and recognition by allowing content to be anonymously and securely shared with many users simultaneously (**Lucero**, 2017). The studies reviewed all highlight the online sites' power when it comes to constructing authentic alternative narratives (**Gray**, 2009; **Cavalcante**, 2020), which are particularly creative in fandoms (online fan communities), where participants create choreography, "fanfiction," video clips, and "fan art" (**McInroy**; **Craig**, 2018; **Kuo** *et al.*, 2022).

Another important function is related to empowerment and political protests surrounding sexual and gender identity. **Hanckel** and **Morris** (2014) found that participating in an online community enabled young people to question the heteronormative structures that perpetuate their marginality and to identify actions of political engagement online and outside of the networks. This issue is important because the LGBT community's best-known protests are held on *Pride Day*, a symbol of the community that, without stigma or shame, destabilizes and confronts LGBTphobic oppression in the public arena. However, the community runs the risk of being turned into a "cheerful and fun" brand for million-dollar businesses –what **Lily** (2016) calls "gaypitalism"– stripping the LGBT movement's protests of their liberating nature as well as their fight against LGBTphobia (**Enguix-Grau**, 2019). However, in other studies, the tension between activism and the market is considered beneficial for the community (**Enguix-Grau**, 2017; 2019). Furthermore, in the context of communicative capitalism, **Dean** (2005) demonstrates the depoliticization of social movements, which is related to the glorification of the individual over the community.

Content-producing social networking sites (SNSs) such as *Facebook*, *Instagram*, or *YouTube* can also meet the friendship and erotic-sexual needs of youth and adults when there are constraints on or a lack of opportunities for experiencing differences in sexuality, as this may be restricted in the offline environments that they move in (**Hillier**; **Harrison**, 2007). As demonstrated by **Craig** *et al*. (2021), the benefits that this type of social network provides to the LGBT community and its subgroups are clear, although the negative effects cannot be overlooked.

There is a higher probability of this community experiencing harassment and bullying in online spaces (**Abreu**; **Kenny**, 2018). According to **Messner** (2016), in these spaces, new forms of masculinity that are vulnerable to these movements emerge and paradoxically spark an outpouring of hate messages to these communities and minorities. **Evelyn** *et al*. (2022) and **Hindujan** and **Patchin** (2020) show that these often take the form of highly threatening transphobic content, cloaked in anonymity, as is the case on *Twitter*. However, for certain topics related to disadvantaged groups, there is no tension and consequent polarization (**Barroso-Moreno**; **Rayón-Rumayor**; **Bautista-García-Vera**, 2023); networks can even be used as a space for effective political expression to provide visibility (**Núñez-Puente**; **D'Antonio-Maceiras**; **Fernández-Romero**, 2021). Although there is little analysis of *TikTok*, precisely due to the complexity of gathering posts (**Guiñez-Cabrera**; **Mansilla-Obando**, 2022), **Weimann** and **Masri** (2020) warn about the extreme right's propagation of hatred on this network –a practice that these authors find even more problematic because of the unique characteristics of *TikTok*: a space used by adolescents and young people that lacks filters that would protect users from harmful messages, as opposed to other networks that do have protection systems (**Cheng-Stahl**; **Literat**, 2022). Furthermore, a study by **Cheng-Stahl** and **Literat** (2022) demonstrates that the playful component of *TikTok* lets young people portray themselves as a powerful and self-confident generation, while remaining vulnerable. Social networks are also central in the dissemination and circulation of disinformation and hate speech from certain political elites (**Adjin-Tettey**, 2022). Although they use different methods aimed at eroding public support for LGBT rights, they all contribute to the informational clutter that affects issues and the community (**Campos-Domínguez**; **Esteve-del-Valle**; **Renedo-Farpón**, 2022; **Strand**; **Svensson**, 2021).

With all of the benefits and threats associated with using digital platforms, we know that, through their design, algorithms, and the sentiments to the content, these platforms influence the nature of the interactions and messages shared (**Arce-García**; **Orviz-Martínez**; **Cuervo-Carabel**, 2020; **Lozano-Blasco**; **Mira-Aladrén**; **Gil-Lamata**, 2023). As **Carpenter** *et al*. (2020) propose, *Instagram*'s visual nature could lead users to focus on esthetic ally pleasing content, in contrast

to *Twitter*, where written text dominates. Also, demographics such as sex, age, and social class affect the use of networks, as does interaction (**López-de-Ayala**; **Vizcaíno-Laorga**; **Montes-Vozmediano**, 2020). As an added benefit, *Instagram*'s visual narrative promotes wellbeing in young people, in contrast to *Twitter*'s written text, which does not provide this positive aspect (**Pittman**; **Reich**, 2016).

> Digital platforms are spaces for social participation with significant value in the development of the identity of adolescents and young adults

A similar statement can be made regarding *TikTok* use, given its audiovisual nature. It is evident that these networks are distinctive semiotic spaces, which could have an effect on the type of messages that are shared and their virality, which has implications for LGBT content. Analyzing and systematizing these issues help elucidate how these social networks contribute to the freedom of expression associated with sexual and gender diversity, either as identity practices or as expressions of LGBT activism. In addition, the results provide critical information such that LGBT lives and stories are affirmed and recognized as complete sexual orientations and gender identities –goals that are part of an area of great scientific interest related to human rights and equal opportunities (**Pérez-Jorge** *et al*., 2020).

The study we present here corresponds to two research questions:

Q1. How does the behavior of each of the selected social networks manifest itself with regard to LGBT content in relation to time and space, virality, and sentiments?

Q2. What are the most viral topics and profiles for LGBT content on *Instagram*, *TikTok*, and *Twitter*?

In view of these questions, which are derived from the review the current situation, this study has two objectives:

O1. Identify LGBT behaviors on *Instagram*, *TikTok*, and *Twitter*, paying attention to virality, temporality, and sentiments.

O2. Analyze and provide examples of the most viral topics on these social networks as discursive spaces of power.

2. Materials and method

The "social listening" technique monitors social networks to listen to what is developing in regard to a topic, extracting analysis parameters for the number of likes, hashtags, and time trends, among others. The social listening technique delves deeply to qualitatively analyze the emotions underlying each piece of data. This article analyzes all of the posts on the aforementioned SNSs that contain the terms "LGTB" or "LGBT" in text, with a grand total of more than 500,000 posts during the six months of collection. The database is sorted by digital platform and number of likes to analyze the 10 most viral posts on *Instagram*, *TikTok*, and *Twitter*.

2.1. Process flow in the methodology

A mixed methodology is used, with a quantitative analysis of all the posts of the aforementioned SNSs and a qualitative analysis of the posts that gained the most interest with the aim of answering the research questions. There are 5 phases, described in Figure 1 and detailed below:

- Phase 1: Identifying the keywords of the issue, "LGTB" or "LGBT." The selected words correspond to gender identity and sexual orientation on digital platforms because the topic revolves around these words and related ones such as "LGBTI+" or "LGBTTI." As they contain the same letters, these are captured by the tool regardless of the language of diffusion.

- Phase 2: Applying the social listening technique to *Instagram*, *TikTok*, and *Twitter* (**Stewart**; **Arnold**, 2018; **Reid**; **Duffy**, 2018). This is applied with the specific software *Social Networks Tools*, owned by the *Detecese* research group, which has high computing capacity (**Barroso-Moreno**; **Rayón-Rumayor**; **Bautista-García-Vera**, 2023). This tool collects all the posts from the aforementioned platforms in real time and analyzes the text to check whether it contains the required keywords; if it has them, the posts are stored in the database, and if not, they are discarded. For this reason, it is not possible to compile posts retroactively. The collection time period is from May 16 to November 16 –half a year.

- Phase 3: Analyzing the structured database computationally and manually. After applying the algorithms for data cleaning, the database consisted of 539,389 posts. The quantitative-computational subphase uses the *IBM Statistical Package for Social Sciences* (*SPSS*) statistical software with machine learning algorithms, text analysis, and integration with Big Data, allowing us to adjust the data to extract hidden patterns and models in the data (**Wagner**, 2019). This process makes
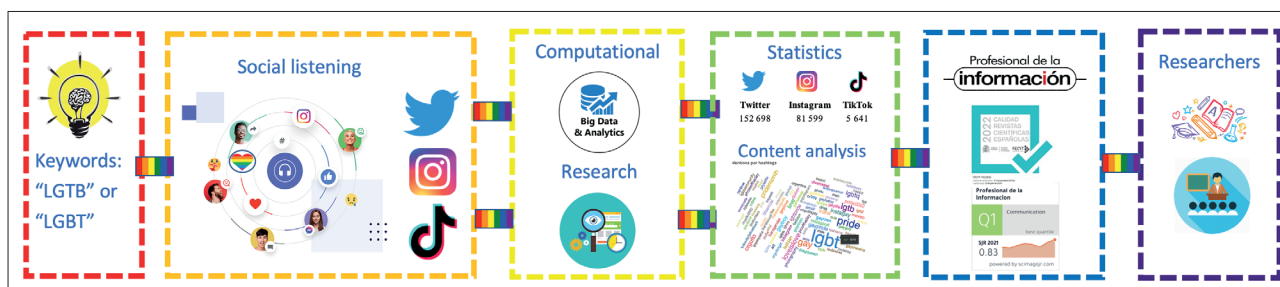
Figure 1. Research flowchart

it possible to identify the number of daily posts, sentiments, and the number of likes, among others, which is a large volume of data. Sentiments are classified into three categories –neutral, positive, and negative– using text mining techniques (**Medhat**; **Hassan**; **Korashy**, 2014). The qualitative-manual subphase is carried out

> " The objective of this study is to identify the behavior and visibility of LGBT content in social networks through monitoring techniques "

by researchers on the 10 posts with the highest number of likes on each social network in a deliberative sampling to analyze the content through text –image, irony, music, and profile influence groups. There is no standard approach with regard to virality (**Zamora**; **Gómez-García**; **Martínez-Martínez**, 2021); however, upon analyzing the three different social networks, the common link used to estimate the most viral posts and profiles was the number of likes, ordered from highest to lowest. This subphase is developed through collaborative coding, carried out simultaneously by the research authors and subsequently verified by two peer reviews by the research group (**Rädiker**; **Kuckartz**, 2020).

- Phase 4: Generating general statistics and analysis of a significant case study. On the one hand, the *SPSS* tool comprehensively analyzes all of the stored data to generate contextual information on the volumetrics associated with each digital platform through cloud computing. On the other hand, researchers select posts that exemplify the resolution of research questions. Regarding the creation of the word cloud, the desired posts from each social network, piece of content, or sentiment, among other options, are selected. First, the content is tokenized to separate each word in the post's text. Second, "stopwords" are applied to eliminate words that do not provide information, such as prepositions or determiners. Finally, a visualization of the most frequent words, and the correlating size, is generated; this allows for the detection of thematic axes in the most viral posts.

This methodology enables us to make the results visible by disseminating and disclosing scientific knowledge in the form of findings. It also makes it possible to offer relevant content to other researchers interested in issues of equity and respect for the diversity of sexual orientations and gender identities on social media.

3. Analysis and results

The database consisted of 539,389 posts, with 331,488 corresponding to *Twitter*, 200,977 corresponding to *Instagram*, and 6,924 corresponding to *TikTok*. The data set was so large and complex that it required Big Data techniques with specialized software for effective data management.

3.1. Virality and associated sentiments on social networks

Figure 2 depicts the dataset of posts collected over 184 days associated with the sentiments of the text, relating them to international commemorative days with the aim of elucidating the volumetrics highlighted. The results obtained showed peaks in posts on international commemorative days and a constant rate of posts on days without protest dates. There are numerous international commemorative days that reflect the diversity of the LGBT community and its demonstrations that take place annually:

- July 17 is the *International Day Against Homophobia, Transphobia, and Biphobia*;
- June 1 is *International Parents' Day*;
- June 28 is *International LGBT Day*;
- July 16 is *International Drag Day*; and
- October 26 is *International Intersex Awareness Day*.

Around *LGBT Pride week*, the volume of posts is high (47,826 posts), due to the numerous demonstrations around the world. This result is seen on June 25; although it is not an international day, it is the Saturday before *International Pride Day*, which leads to a huge volume of videos, photos, and text related to the celebrations around the world.

The largest number of posts and polarizations, for and against the LGBT movement, were concentrated around *International Pride Day*. Quantitatively, there were 10,593 neutral posts, 6,706 positive posts, and 2,833 negative posts. Although there were millions on the network related to this day, remember that the identification was done using the keywords contained in the text of the post, not in the image or in synonyms; for this reason, we said that the daily volume was in the thousands.

The demonstrations on SNSs on international days had a high impact due to the symbols, emotions, and polarity of the messages. The multimodality of the messages, mainly from *Instagram* and *TikTok*, showcased creative audiovisual materials, with emblematic songs that reflect the progress of activism. Gloria Gaynor's *I Will Survive* (1978) became an LGBT anthem as did Alaska's *A quién le importa* (1986). These stand as timeless anthems that represent the transition of the movement from an oppressive situation rife with strong stigmatization to showing the right to be different as a demand for freedom of expression of sexual orientation and gender identity.

Another aspect of the impact on SNSs is the advocacy of the younger population against LGBTphobia. On *TikTok*, multimodal messages and comments had positive connotations to a greater degree than on the other two networks. *Twitter*, on the other hand, which has an older user profile and a monomodal message, had the highest number of posts with negative connotations. Overall, *Twitter* had more posts like this than *Instagram* and *TikTok* combined. In fact, negative sentiments were associated with the terms "parade" and positive feelings with the term "demonstration". In summary,
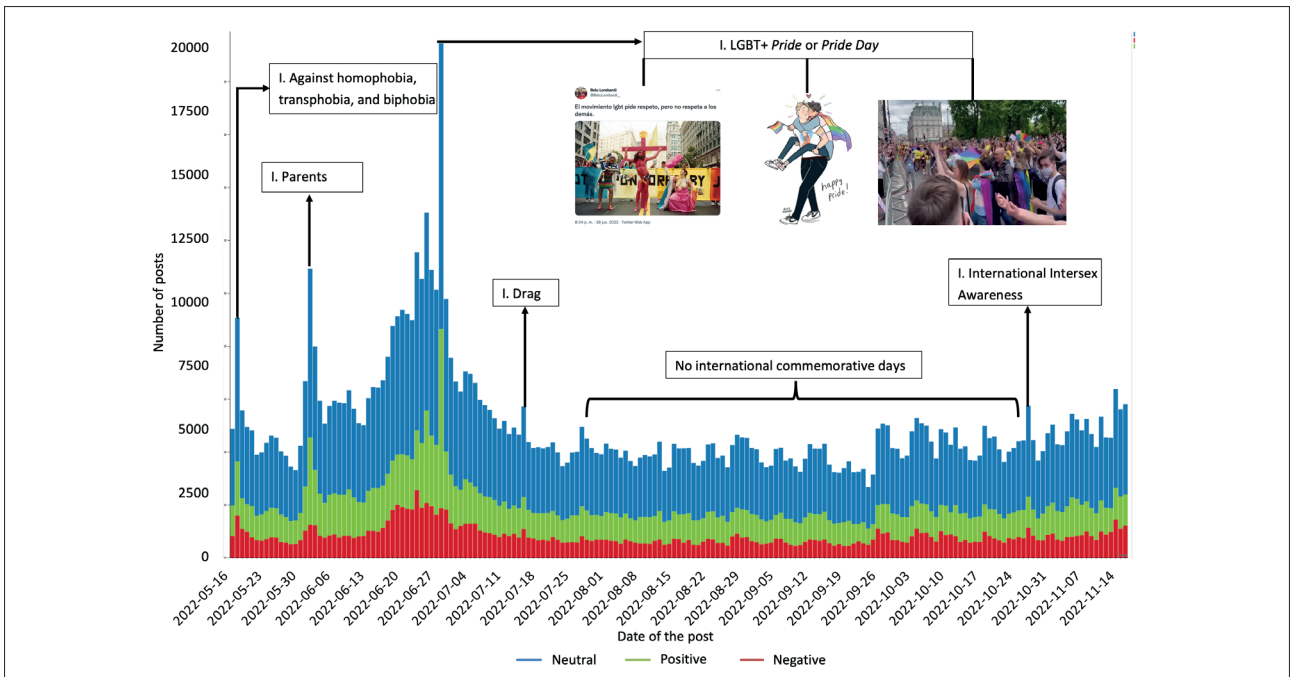
Figure 2. Timeline of the number of posts by associated sentiment and international days important to the LGBT community

international commemorative days gave more viral visibility to the LGBT community, but the content had a lasting presence in the time span analyzed.

3.2. Viral content and topics on social networks

In the following sections, the analysis of the 10 most viral posts for each social network is presented. Table 1 has been created so that the reader can follow the main idea and corroborate the information presented. We have also provided a link to *Figshare* (*https://bit.ly/3VO0Lfn*) with information on the complete analysis of the posts in Table A.1 (Annex). To add value to the results presented, access to the database of the most viral post on *TikTok* is allowed, since its analysis with Big Data is novel.

Table 1. Top 10 most viral posts on *Instagram*, *TikTok*, and *Twitter* with LGBT content

Social network	ID	Link	Social network	ID	Link	Social network	ID	Link
TikTok	TT01	*https://bit.ly/3rg8vKf*	**Instagram**	IG01	*https://bit.ly/3fxA3sh*	**Twitter**	TW01	*https://bit.ly/3E49kxm*
	TT02	*https://bit.ly/3SsrzRM*		IG02	*https://bit.ly/3SvvZaA*		TW02	*https://bit.ly/3y2aupE*
	TT03	*https://bit.ly/3Sq6CXl*		IG03	*https://bit.ly/3LS4iGa*		TW03	*https://bit.ly/3Sqmk4R*
	TT04	*https://bit.ly/3LUcXYD*		IG04	*https://bit.ly/3Ci1eQu*		TW04	*https://bit.ly/3re7DpL*
	TT05	*https://bit.ly/3ftYnLB*		IG05	*https://bit.ly/3Ckwsqh*		TW05*	*https://bit.ly/3dZibWx*
	TT06	*https://bit.ly/3Spd1SR*		IG06	*https://bit.ly/3CkFBiA*		TW06	*https://bit.ly/3QtZSb2*
	TT07	*https://bit.ly/3rfolVN*		IG07	*https://bit.ly/3RoLSOr*		TW07	*https://bit.ly/3SqrzS3*
	TT08	*https://bit.ly/3y291Qa*		IG08	*https://bit.ly/3UPy0jd*		TW08	*https://bit.ly/3Rm8ajN*
	TT09*	*https://bit.ly/3dNFYJf*		IG09*	*https://bit.ly/3riiE9t*		TW09	*https://bit.ly/3rjMfiU*
	TT10	*https://bit.ly/3E14Ml7*		IG10	*https://bit.ly/3LQVlgp*		TW10	*https://bit.ly/3CkxvGJ*

*The links to posts TT09, IG09 and TW05 have been removed from digital platforms due to user complaints about the content of the publication, but the description and verification of them are available on *Figshare*: *https://bit.ly/3VO0Lfn*

3.2.1. *Twitter*

Text production on *Twitter* was the most prolific, with 61% of posts. It is the simplest due to its multimodal structure: written text predominates. Compared with *TikTok* or *Instagram* –multimodal platforms that are conceptualized from discursive polymorphism– *Twitter* is the most active and intensive platform in terms of posts and comments. The viscerality of the comments was an identifying characteristic of the contributions of those commenting on the LGBT subject: Insults, harassment, generalized claims, and links to news or videos as proof of validity were the means most often used.

Messages on *Twitter* received greater engagement from recipients (average of 1,566 retweets), going beyond simply reading with more visceral and irrational behavior than on other platforms. These posts, with a high percentage of positive or negative sentiments, had a direct impact on the topics and spaces for dialogue.

Analysis of the messages showed a polarized dialogue. An LGBT rights demonstration led to anti-LGBT messages. The thematic blocks and underlying themes are represented in Table 2, indicating the most representative tweet for each theme, permitting visualization without needing to access the links.

A first axis sought to reclaim the rights of the LGBT community based on opinions as a defense against opposing views (TW01). This message had the highest number of likes (17,743) and the second highest number of retweets (3,987). This type of message received comments that reinforced people's identification with the message, told their personal story, and, as criticism, spouted fallacies through generalization or ad hominem to try to discredit the central idea proposed.

A second axis, more extensive and prolific in terms of messages and subject matter, was made up of criticism and defense at all costs, which took the form of the following themes:

- Film and television. Allusions to *Disney* movies served as a pretext to launch scathing attacks and make representations in traditional media invisible (TW04).
- Rights and freedoms. They were criticized through irony with rhetorical questions to delegitimize the discussions related to the community (TW03).
- *Pride Day*. Dissemination of the demonstrations around the world with a festive atmosphere with music and dance to give visibility (TW09), although these were also used by users to criticize or defend the community.
- Politics. A retweet of a biased interview with the Minister of Equality was used to question the claims and generate false information. The debate that arose among users caused a division. Supporters of the Minister's point of view took care to justify the content of the interview through links to other media outlets with the full interview: *https://bit.ly/3CkxvGJ*
- Criticism. The most significant case –with the most retweets (5,131) and the second, with the second most likes (17,352)– contained an image with a semiotic charge aimed at delegitimizing and questioning the respect that the community requests for itself. This led to a climate of comments received that bordered on censorship and rhetoric centered around "aberration, degenerates or psychological problems" (TW05). Subsequently, the participating accounts were reported and removed from the network, but the history and screenshots of the post in question were retained.

Table 2. Themes detected on *Twitter* and a significant post associated with it

Personal opinions	Film and television	Rights and freedoms
nash @olivernashbb — Kids aren't forced to be lesbians or be gay or be bisexual or be trans, much less are they turned that way by seeing two women kiss, but there are LGBT kids who are forced to be heterosexuals or cis, because LGBT people aren't born when they're 18 years old — 3:40 p. m. · 19 jun. 2022 · Twitter for Android — 3.966 Retweets 56 Tweets citados 17,7 mil Me gusta	**DROSS** @eldiariodedross — On twitter there are people who need Disney to show them in order to feel lgbt. But... 89 years ago this happened. And the Minions didn't kick these lesbians' butts #Lightyear — 8:24 a. m. · 5 jul. 2022 · Twitter for iPad	**Pablo Aure** @pabloaure — I don't understand the reason behind making an international *LGBT Pride day*. It's ridiculous to set days to celebrate sexual preferences. *Pride* shouldn't be about tastes, but rather about a person's talent, work or artwork, never about these kinds of things. — 2:06 p. m. · 28 jun. 2022 · Twitter for Android — 1.352 Retweets 173 Tweets citados 5.186 Me gusta
TW01	TW04	TW03
International commemorative day	**Politics**	**Criticism**
Seriéfil@s Enfurecid@s @serienfurecidos — The cast of #Heartstopper standing up to anti-LGBT protesters at UK #Pride. — Translate Tweet — 11.5M views 0:15 / 0:38 — From Scott Beasley — 4:30 PM · Jul 2, 2022 · Twitter for Android — 613 Retweets 103 Quote Tweets 3,052 Likes	**Irene Montero** @IreneMontero — This is why *Pride* is so important — muchísimas personas LGTBI que no se atreven a ir de la — 195.8K views 0:09 / 0:51 — 12:33 PM · Jul 9, 2022 · Twitter Media Studio — 1,459 Retweets 259 Quote Tweets 4,843 Likes	**Belu Lombardi** @BeluLombardi__ — The lgbt movement asks for respect, but it doesn't respect others. — 8:04 p. m. · 28 jun. 2022 · Twitter Web App — 5.094 Retweets 730 Tweets citados 17,2 mil Me gusta
TW09	TW10	TW05

3.2.2. *Instagram*

This social network accounted for 37% of total posts. The LGBT community drew upon static images for its *Instagram* posts. The multimodal narratives that unfolded one after the other on this network combine static images (photographs, drawings, or icons) with textual combinations where typologies and color schemes were changed up.

Instagram offers the option of posting content as either static images or videos ("reels"), but these are not considered in the selection for interactions received. Posts with static images can be combined into more than one image (IG03 and IG08) or a single rendering (IG01 or IG02). The use of hashtags was higher compared with other social networks, as it is a characteristic feature of *Instagram*. While *TikTok* had an average of 7 hashtags per post, *Instagram* reached 12 hashtags on average. The LGBT issue on *Instagram* was presented through different semiotic renderings:

- Static infographics. A combination of text with icons that were used with an intention of educating and vindicating, especially during specific dates of the year (IG05, IG10).
- Manicured images. Photographs with esthetic appeal to contextualize motivational messages or to overcome difficulties (IG01) or to protest and fight against social stereotypes of the community (IG08).
- Irony. News published on other media outlets (*Twitter*) that served as a pretext to speak out against the community's situation, especially in the Middle East (IG02).
- Politics. Political representatives from around the world took a stance on the LGBT movement. One exemplification is that the political parties of Spain, except one, added the rainbow flag to their logo to commemorate pride (IG07).
- Information. Dissemination of information about the semantic explanation of the terminology of the different groups that make up the LGBT community (IG03).

Of these posts, the post that received the highest number of likes and comments stood out. The *CNN* post that explains the meaning of the different concepts of the LGBT semantic field was the one that received the most user interaction (72,331 likes) and the one that received the highest number of comments (11,315), influenced by the day of posting. Minimalist esthetics, text that showed both the concept and explanation, and an appropriate selection of color scheme were the keys to its success, as shown in Figure 3.

This post had a total number of 9 slides, which helped to expand upon the essential information to establish and disseminate some of the basic concepts regarding the

Figure 3. Post IG03 exemplifying LGBT terminology

community. The post with the most user interactions was also the one with the highest number of comments. This fact corroborated a practice that was more evident on *Instagram* than on *TikTok*: derogatory comments. Those posts that have them enabled received comments that showed their disapproval through value judgments, absolute assertions, fallacies, or biblical references used as counterarguments to the post, or by regurgitating political slogans. This practice was present in both posts from LGBT community and those of political entities with not ideologically allied with the community.

Also noteworthy was the self-serving use of the #LGBT hashtags for other –mostly commercial– purposes. A cosplay gamer with a sexualized outfit (IG06) or a photo of a model in lingerie advertising a sexual encounters website (IG09) exemplified practices that are a far cry from the core purposes of the community, using its reach to transmit commercial messages to the public.

3.3. *Pride* and the virality of a news item on *Instagram*, *TikTok*, and *Twitter*

Table 3 presents the most viral post on each social network about the *Pride* demonstration on Saturday, July 2, 2022, at *London Pride*, which were handled in conflicting ways to impose self-serving meanings. This comparative analysis –which has not been analyzed previously– proved to be a specific case study that confirmed the trends from each social network as described above. The situation was that a young man approached the barricades during the parade to remove an anti-LGBT banner, at which point the anti-*Pride* protesters grabbed his arm and demanded the presence of the police, who arrived at the scene, where the young man managed to escape. At this point, the actors of the *Netflix* series "Heartstopper," Locke, Croft, and Browne, started dancing while giving them the middle finger with the refrain of "I want to dance with somebody" by Whitney Houston playing in the background. After this incident, the rest of the protesters entered the shot and continued the march.

This single event was used in various ways deliberately because the visual and sound composition were altered, and the original video had been manipulated. On each SNS, the audiovisual material focused the users' attention on different details with the aim of, on *Twitter*, triggering the delegitimization of the community and, on *Instagram* and *TikTok*, supporting it.

In terms of number of likes, *TikTok* consolidated its position as the network with the most interactions, with 18.9M views, followed by *Instagram* and *Twitter*. In reference to the profiles, there was consonance between the disseminators of posts, being specialized digital creators, and the media, which supported the reason for such virality. The text and the associated sentiment according to social network followed the same trend presented above: *Twitter* had negative sentiment, with terms such as "defiant", whereas, on *Instagram,* positive text for words like "more love" and heart emoticons were used. Finally, on *TikTok*, positive messages such as "favorite things" were used. Regarding images, on *Twitter,* the news focused on the violent gesture –the grabbing and shaking of the demonstrator's arm– prompting comments against the demonstration, linked to the polarization of this platform. On *Instagram*, the young man tugging on the arm was removed from the scene, and the *Netflix* actors' dancing and giving the middle finger to the anti-LGBT protesters was shown with minimalist editing of the video and watermarks with advertising. Finally, on *TikTok,* the news item was presented with careful editing, with the anti-LGBT protester pulling the arm and hair of the young man and, in protest, showing the subsequent joyful dance of the *Pride* marchers.

We consider the video fragment analyzed to be of particular importance since it was deliberately used by ideologies antagonistic to defending LGBT rights. The framing showed the clash between those marching on the right of the image, wrapped in the rainbow flag and dressed in more youthful and casual attire as compared with those who were protesting with written banners who were dressed in more conservative attire on the other side of the barricade with the police nearby. In the video, the chorus of Whitney Houston's "I want to dance with somebody" played in the background, and the message was a clear plea for love regardless of the shape of those taking part in the parade. However, depending on what message was to be transmitted, the ambient sound was kept or replaced with a more emotionally charged song or music. Composition was used deliberately on social media by both viewpoints since it offers a narrative that can be used to manipulate the connotation as one wants. From the point of view of the demonstrators (the LGBT community), an attack on rights and the freedom of expression was denounced in using the first seconds of the video, where some spectators (opposed to the demonstration) forcibly detained some of the demonstrators, demanding that the police stop them. The same video, seconds later, was used by the conservative sector to criticize the lack of respect and empathy through the use of protesters' gestures/insults the against them. The conservative sector condemned the demonstrators wanting to tear the banners that openly criticized the parade's motives from the barricades.

Therefore, we can determine that the user profiles were different on the SNSs, similar to the danger of generating so-called echo chambers by listening only to related information without understanding the context of the situation and

Table 3. Case study of the LGBT protest in London on July 2, 2022 on social networks

Social network	Virality	User	Content	Screenshot and music
Twitter	Position 9 of 331,488. The most viral on 7/2/2022. Likes: 3,054 Retweets: 11.4M Comments: 616 *https://bit.ly/3dSGS73*	**Seriéfil@s Enfurecid@s** Digital cinema content creator	The cast of #Heartstopper standing up to anti-LGBT protesters at the United Kingdom's #Pride	Ambient sound of whistling and shouting with *I wanna dance with somebody*
Instagram	Position 153 of 200,977. The most viral on 7/4/2022. Likes: 8,285 Reposts: 36,726 Comments: 155 *https://bit.ly/3Cm3iXC*	**Bousnid** Digital creator of trending content	For a world with less hate and more love 🧡💛💚💙💜 the actors from "Heartstopper" face off against an anti-LGBTQ+ group at London *Pride* (...) #heartstopper #joelocke #pride #lgbtq #lgbt #gay #bi #pride #kitconnor #pridemarch	Music: *I wanna dance with somebody*
TikTok	Position 6 of 6,924. The most viral on 7/2/2022. Likes: 2.7 M Reposts: 18.9 M Comments: 21.8 K *https://bit.ly/3Spd1SR*	**Kitnickaep** *Heartstopper* fan platform (*Netflix*)	joe & bash ending homophobes is now my favorite thing #joelockeedit #sebastiancroftedit #heartstoppercast #londonpride #lgbt	Music: *You're the man but I got the power*

events that have occurred. This situation is favored by digital platforms to engage more user time and obtain higher diffusion ratios. It is the news media who must ensure the eradication of these informative biases in social networks and avoid political and social polarization by combating manipulated content, or fake news.

> ❝ The tension between activism and the market provokes the distortion of divergent narratives to impose interested meanings on the demands on *Pride Day* ❞

4. Discussion and conclusions

The results obtained showed the viral and sustained presence of LGBT content on the analyzed networks, and answered Q1. The social networks' behavior varied, and this revealed homophobia and LGBT activism that users were not indifferent to, generating large-scale participation. The way in which the LGBT content performed is relevant for two opposing reasons: first, the need for expression, acceptance, awareness, inclusion, and recognition of the community's rights was made visible with evident impact, not only on international commemorative days. Second, there was evidence of polarization and negative feelings linked to LGBTphobia, aimed at delegitimizing expressions of identity and protest (**Campos-Domínguez**; **Esteve-Del-Valle**; **Renedo-Farpón**, 2022; **Strand**; **Svensson**, 2020), which was more intense when LGBT activism was more visible offline, on *Pride Day* and other international commemorative days.

However, this behavior was not the same across digital platforms, as indicated by the previous studies of **Arce-García**, **Orviz-Martínez** and **Cuervo-Carabel** (2020), and **Lozano-Blasco**, **Mira-Aladrén** and **Gil-Lamata** (2023). *Twitter* had the highest number of posts, greater polarization, and lower virality, and brought together adult age profiles for the most part. *Instagram* collected varied content related to the need to express sexual orientation and gender, erotic-sexual, and emotional identity, and had occasional virality and middle-aged profiles. *TikTok* had the absolutely highest virality due to positive messages of an esthetic and emotional nature and young profiles. However, the polarization and negative messages linked to *Twitter* with topics related to inequality for disabled communities do not follow this pattern of behavior (**Barroso-Moreno**; **Rayón-Rumayor**; **Bautista-García-Vera**, 2023). Along the same lines pointed out by **Abreu** and **Kenny** (2018), as well as by **Evelyn** *et al*. (2022), *Twitter* was the network most prone to LGBTphobic demonstrations, some of which could constitute a crime. Keep in mind that the polarized subject matter and sentiment on this network contrasted with the more positive and accepting behavior on *Instagram* and *TikTok*. The polarization of messages generated a space of discursive conflict that hindered debate and analysis in questioning the heteronormative structures that perpetuate the marginality and oppression of the LGBT community, as **Hanckel** and **Morris** (2014) point out. Undoubtedly, *Twitter* provided the greatest evidence that *Pride Day* destabilizes and confrontse LGBTphobic oppression (**Enguix-Grau**, 2019). The results obtained suggest that it would be advisable to study the strategies of disinformation and hate speech on this social network in depth, in the line proposed by **Campos-Domínguez**, **Esteve-del-Valle** and **Renedo-Farpón** (2022) and **Strand** and **Svensson** (2020). This content would be relevant for developing of training programs that contribute to educating citizens to be informed and think critically in the face of strategies and groups that attack the rights of the LGBT community, and as an alternative in combatting cyberbullying.

In relation to Q2, it is evident that the social networks analyzed in the context of the LGBT movement were discursive spaces of power and counter-power that defined a struggle to impose themes and discredit their purpose of protest. This condition was evident for *Twitter* (**Núñez-Puente**; **D'Antonio-Maceiras**; **Fernández-Romero**, 2021), but not so evident for *Instagram* and *TikTok*. In contrast to *Twitter*, these networks were revealed to be more accepting spaces to disseminate protest stories that legitimize the expression of sexual orientation and gender identities.

TikTok showed that it is a space for expression through emotional narratives with a creative esthetic component, just like *Instagram*, which hosts motivational messages of self-improvement. In this sense, as evidenced by the works of **Fox** and **Ralston** (2016), **Graig** and **McInroy** (2014), **Graig** *et al*. (2017), and **McInroy** and **Graig** (2017), both networks could serve the needs of expressing gender identities. Two factors justify this statement: the age of the users (**López-de-Ayala**; **Vizcaíno-Laorga**; **Montes-Vozmediano**, 2020) and the audiovisual component of both networks. If the adolescents and young people's loyalty to these networks is to be maintained, both platforms must continue to embrace a creative and polyphonic multimodal production, such that the esthetic component could be put at the service of subversive and political narratives, as proposed by **McInroy** and **Craig** (2018) and **Kuo** *et al*. (2022). The connotative openness of the audiovisual narrative could be used for such purposes. Note that *TikTok* was the least polarized platform, with more positive messages and an extreme virality that reached millions of users.

The visual nature of *Instagram* and *TikTok* oriented users to emphasize positive and esthetically pleasing content due to the visual component; however, the predominant presence of text on *Twitter* did not provide these positive aspects, as evidenced by the studies of **Carpenter** *et al*. (2020) and **Pittman** and **Reich** (2016). Communicating with images requires a rhetorical argument and, therefore, a more complex reception than that required by written messages. This fact would explain why the predominance of written text on *Twitter* encouraged hate speeches, given that communicating aversion, dislike, rejection, and even insults to a community through a visual narrative requires creation time and its decoding will always be more open to interpretation. Social networks' asymmetric behavior turned the analyzed networks into discursive spaces of power and counter-power. The results analyzed through the most viral posts also showed that these networks are a space of discursive conflict in which content creators, traditional media, and paid audiovisual platforms –*Netflix* in

our analysis– are involved. *London Pride*'s surprising virality on *TikTok*, orchestrated by a fan platform for a *Netflix* series, legitimized LGBT activism and indicated what **Enguix-Grau** (2017; 2019) posits: the tension between activism and market can be productive. However, digital platforms cannot be isolated from the communicative capitalism defined by **Dean** (2005), so they could have a future division, fragmenting and individualizing the LGBT movement.

> "There is no doubt that it is necessary to foster a digital citizenry capable of critical thinking to ensure respect for sexual orientation and gender identity diversity on social networks"

The results obtained showed a multidimensional, varied, and diverse behavior for LGBT content on the analyzed platforms. The dynamic evolution of these digital sites made it difficult to predict the consolidation of some of the features identified, which may contribute to the visibility and understanding of the LGBT community. There is no doubt that it is necessary to foster a digital citizenry capable of critical thinking to ensure respect for sexual orientation and gender identity diversity on social networks. In this sense, it seems reasonable that the content creators in favor of or demanding rights for the LGBT community take into account the differentiated behavior on social networks and the roles that *Instagram* and *TikTok* could play in communicating the needs, interests, and demands of the community in a more effective and positive way.

The social network *TikTok* presented a limitation to this study due to two reasons: the focus of the trends detected that would require a more exhaustive analysis of the profiles, and the expansion and the dominant character that this network has acquired among the social media. Therefore, as a future line of study, we propose studying in depth the performance of LGBT content on *TikTok* and what kind of expressions protesting on behalf of diversity are more viral and how they are constructed from a multimodal point of view.

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6. Annexes

A.1. Terminology

The term "LGTBQI+" ["*LGTBIQ+*"] stands for "Lesbian, Gay, Bisexual, Transgender, Transsexual, Transvestite, Queer, and Intersex." The acronym has evolved; in the early 1990s, it was just "LGB" to stand for other gender identities and sexual orientations. A lesbian woman is attracted to another woman, and a gay man is attracted to another man; both terms are grouped under the heading "homosexual" because they are attracted to people of the same sex. A bisexual person is attracted to women or men emotionally or physically. Continuing the explanation, the letter "T" was introduced as a

reference to various categories of transgender, which refers to people who are born with male or female physical characteristics but feel they are the opposite sex. "T" includes transsexuals, who are transgender people who take medication or undergo surgery to change to the sex that they feel they truly are. "T" also encompasses transvestites, people who dress and behave as the opposite gender in public or private. Subsequently, the letter "I" was included; it refers to intersexuals, who are born with both male and female genitalia, and a combination of chromosomes prevents the identification of a specific sex. For this reason, you can find the gender term with triple "T," resulting in the word "LGBTTTQI+" ["*LGBTTTIQ+*"] The final letter, "Q," comes from the word "queer," which means "unusual" ["*raro*"]. In the 1990s, it was a derogatory term, but the LGBTQI community has reclaimed it to mean people who live freely without labels. The + symbol encompasses minorities within the LGBTIQ+ community (**Carlson**, 2014), such as demisexuals, pansexuals, or omnisexuals, among others. Demisexuals feel attracted to a person based on getting to know them very personally. Pansexuals and omnisexuals are attracted to people who do not identify as any particular gender (**Enguix-Grau**, 2019; **Caceres** *et al.*, 2020). For these reasons, the term "LGTBQI+" is understood to comprise and include all of the groups that compose it; however, apart from here, the text refers to the community as "LGBT," as this was the most common term used in the dissemination and even in titles of journals such as the *Journal of LGBT Youth*.

A.2. Top 10 most viral posts on *Instagram*, *TikTok*, and *Twitter* with LGBT content

Social network	Identifier	Link	*Likes*	Retweets o comments	*Following*	*Followers*
TikTok	TT01	*https://bit.ly/3rg8vKf*	4 723 984	20 163	495	31 761
	TT02	*https://bit.ly/3SsrzRM*	4 352 815	23 632	147	67 125
	TT03	*https://bit.ly/3Sq6CXl*	2 379 263	26 731	3 143	72 784
	TT04	*https://bit.ly/3LUcXYD*	9 664 592	108 262	2 015	828 411
	TT05	*https://bit.ly/3ftYnLB*	3 219 328	48 253	768	15 038 610
	TT06	*https://bit.ly/3Spd1SR*	2 743 001	22 129	355	71 329
	TT07	*https://bit.ly/3rfolVN*	2 202 128	11 347	231	28 931
	TT08	*https://bit.ly/3y291Qa*	2 003 229	8 512	139	106 892
	TT09*	*https://bit.ly/3dNFYJf*	1 732 641	11 529	99	42 432
	TT10	*https://bit.ly/3E14Ml7*	2 112 325	13 608	105	20 456
	Promedio		3 040 932	29 417	750	1 630 873
Instagram	IG01	*https://bit.ly/3fxA3sh*	50 206	0	1 871	26 725
	IG02	*https://bit.ly/3SvvZaA*	40 922	384	170	1 185 783
	IG03	*https://bit.ly/3LS4iGa*	72 331	11 315	405	6 672 817
	IG04	*https://bit.ly/3Ci1eQu*	52 575	0	992	1 045 919
	IG05	*https://bit.ly/3Ckwsqh*	39 471	409	0	2 005 815
	IG06	*https://bit.ly/3CkFBiA*	24 882	76	119	457 312
	IG07	*https://bit.ly/3RoLSOr*	23 161	1 381	290	650 981
	IG08	*https://bit.ly/3UPy0jd*	21 813	234	1 774	125 673
	IG09*	*https://bit.ly/3riiE9t*	47 721	335	992	1 045 919
	IG10	*https://bit.ly/3LQVlgp*	42 981	367	0	2 005 815
	Promedio		41 606	1 450	661	1 522 276
Twitter	TW01	*https://bit.ly/3E49kxm*	17 743	3 972	951	50 129
	TW02	*https://bit.ly/3y2aupE*	6 277	1 251	623	194 267
	TW03	*https://bit.ly/3Sqmk4R*	5 194	1 356	1 724	280 942
	TW04	*https://bit.ly/3re7DpL*	8 556	428	86	3 872 304
	TW05*	*https://bit.ly/3dZibWx*	17 252	5 131	37	30 941
	TW06	*https://bit.ly/3QtZSb2*	3 692	915	1 453	64 916
	TW07	*https://bit.ly/3SqrzS3*	9 377	1 044	1 921	1 741
	TW08	*https://bit.ly/3Rm8ajN*	2 640	284	2 331	620 728
	TW09	*https://bit.ly/3rjMfiU*	3 061	616	2 993	15 321
	TW10	*https://bit.ly/3CkxvGJ*	3 029	658	1 233	9 562
	Promedio		7 682	1 566	1 335	514 085

* Note: Some of the posts have been removed by the social networks themselves after accumulating complaints from users for unlawful interference with the right to honor (civil consequences) and for public libel and slander with insults against individuals or communities (criminal consequences). In addition, certain sexual content in text (S€x) or photographs (intimate parts) has been removed from the aforementioned digital platforms, causing the links to become inaccessible over time.

Misogyny and the construction of toxic masculinity in the Spanish Manosphere (*Burbuja.info*)

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Abstract

The anonymity of the Manosphere has provided a fertile breeding ground for the spread of misogyny through increased hate speech on the Internet. In recent years, this virtual space composed mostly of men, has been the subject of numerous studies aimed at identifying the discursive mechanisms of identity constructions that underlie the denigration of women. This paper takes the findings from international research on the subject to address a phenomenon still little explored in Spain through the analysis of misogynistic comments on *Burbuja.info*. Economic forum. The analysis sample comprises 4,281 messages that include the lexeme "woman" posted over 2.5 years, 761 of which contain expressions that ridicule, disparage, or insult women. Thematic analysis demonstrates the repetition of misogynistic topics and tropes common in the most radical *Reddit* and *4chan* subforums, such as hypergamy, objectification, and the constant disparagement of the world of women, not to mention criticism of feminism, left-wing political parties, and legislation on gender violence. The results obtained show that the "male identity crisis" is narratively constructed in the messages on Burbuja.info using the motif of sacrifice –the cornerstone of a monotypic story in which the purpose of the hero-man-victim's journey is to punish the villain-woman. Furthermore, we also found that there are different configurations of identity related to attitudes toward women; these match up with the four most prominent masculinist subcultures identified in the leading literature on the subject: *Men Rights activists* (*MRA*), *Men Going Their Own Way* (*MGTOW*), *Pickup Artists* (*PUA*), and *Involuntary Celibates* (*Incels*).

Keywords

Manosphere; Misogyny; Hate speech; Sexism; *Burbuja.info*; Feminism; Masculinities; Identities; *MRA*; *MGTOW*; *PUA*; *Incels*.

1. Introduction

The massacre in Isla Vista (California), perpetrated by Elliot Rodger in 2014, and his reference to the *Incels* in the video that he released on *YouTube* before committing suicide, directed media attention to that misogynist group, which Rodger himself described in his "Manifest" as "a forum full of men who are starved of sex, just like me."[1]

Four years later, Alek Minassian committed murders in Toronto and mentioned Rodger on *Facebook*, proclaiming,

> "The Incel Rebellion has already begun! We will overthrow all the Chads and Stacys! All hail the Supreme Gentleman Elliot Rodger!,"

impacting on the more radical forums while intensifying public concern about hate speech against women on the Internet (**Venäläinen**, 2022). Minassian's pronouncement further demonstrated that misogynists also hate those men who, in the narrative of their tormented sexuality, "steal" women from them: the alpha males or "Chads" (**Bates**, 2020; **Johanssen**, 2022; **Vallerga**; **Zubriggen**, 2022).

Since then, the media, institutions, and academia have issued warnings about the expansion of the Manosphere –the virtual space through which misogynistic messages circulate and are perpetuated– and this ecosystem's influence in the real world, which has become a real threat (**Ebner**, 2021). Research carried out to date underlines the powerful appeal that masculinist communities have for both adult men, disillusioned with the expectations created by neoliberalism, and young men, weighed down by their own insecurities (**Banet-Weiser**, 2018; **Bujalka**; **Rich**; **Bender**, 2022; **Sugiura**, 2021; **Van-Valkenburgh**, 2021; **Vingelli**, 2019). It also highlights the similarity between anti-feminist communities and far-right ideology, with which they share a misleading and all-encompassing notion of masculinity (**Bazzano**, 2022; **Carreras**, 2019; **Johanssen**, 2022; **Lacalle**; **Martín-Jiménez**; **Etura-Hernández**, 2023; **Marwik**; **Lewis**, 2017; **Messner**, 2016; **Nagle**, 2017).

Complementary to some contributions on the Spanish Manosphere (**Bonet-Martí**, 2021; **Caldevilla-Domínguez** *et al.*, 2022; **García-Mingo; Díaz-Fernández**, 2022a; 2022b; **García-Mingo**; **Díaz-Fernández**; **Tomás-Forte**, 2022; **Lacalle**, 2023a; 2023b; **Juárez-Miro**; **Toff**, 2022), this article aims to deepen the understanding of a phenomenon that is still in an initial phase of study in Spain by analyzing misogynistic messages on one of the most popular forums: *Burbuja.info*. The specific aim of this study is to determine the different modalities of the construction of identity in the comments that make up the sample. We start from the hypothesis that hate speech against women on *Burbuja.info* forms a melting pot of identities with characteristics similar to the subtypes identified in the English-language literature on the subject:

- *Men Rights Activists* (*MRA*)
- *Men Going Their Own Way* (*MGTOW*)
- *Pickup Artists* (*PUA*)
- *Involuntary Celibates* (*Incels*).

The study also takes as its premises some of the results obtained by research conducted using Big Data techniques, notably how posts are perpetuated, the porosity of the different echo chambers that make up the Manosphere, and the gradual transition of the members of the oldest communities (*MRA* and *PUA*), which come from the real world, to the most radical ones (*MGTOW* and *Incels*), generated in the virtual environment (**Farrell** *et al.*, 2019; **Frenda** *et al.*, 2019; **Hopton**; **Langer**, 2022; **Horta-Ribeiro** *et al.*, 2021; **Krendel**; **McGlashan**; **Koller**, 2022; **Manne**, 2018).

2. The Manosphere

The origins of misogynist groups can be traced back to the men's liberation movement of the 1970s and the fathers' rights movement of the 1990s, as with the pioneering National Coalition for Men founded in 1977 that remains very active today. The development of the Internet from the mid-2000s onward brought about the meeting of these first subcultures and the new masculinist communities that emerged on the Internet, with the declared objective being "[to] eliminate gynocentrism and male disposability."[2]

The term "Manosphere" was first used in a 2009 blogspot to denote

> "a chaotic, decentralized, heterogeneous, and constantly changing nebulous online community" (**Lilly**, 2016, p. 134).

The designation gained increasing popularity following the 2012 publication of Ian Ironwood's book *The Manosphere: A New Hope for Masculinity*. Since then, it has been used as an umbrella term to describe

> "everything from progressive men's issues activists dealing with real neglect of male health, suicide and unequal social services to the nastier corners of the Internet, filled with involuntary celibacy-obsessed, hate-filled, resentment-fueled cultures of quite chilling levels of misogyny" (**Nagle**, 2017, p. 86).

The communities in the Manosphere are rooted in the propagation of their misogynistic and anti-feminist discourses (**Ging**; **Siapera**, 2018) and are recognized for their proven toxicity (**Krendel**; **McGlashan**; **Koller**, 2022). Despite the univocality of their attitude toward women and the common language they share (**Marwick**; **Caplan**, 2018), the Manosphere is composed of an extensive and diffuse network of subreddits, blogs, social networks, and forums. Its heterogeneity comes from its complexity and extreme fragmentation as well as its constant evolution (**Kyparissiadis**; **Skoulas**, 2021). However, far from impeding their configuration, the characteristic diversity of these groups does not preclude their re-

presentation as a phenomenon in the social imaginary, since their shared contempt for women acts as the glue that binds together a variety of disparate or sometimes even antithetical characteristics. In fact, the communities in the Manosphere are typified by the porosity of the boundaries between them and the ease with which they relate to one another (**Han**; **Yin**, 2022). It follows a structure of concentric circles

> The shared rituals of the Manosphere are structured around nostalgia for the lost privileges and consequent self-victimization of grieving men, stripped of their ancestral rights by women

> "in which these narratives are being intensified as a consequence of the emergence and dissemination of sexist and anti-gender discourses in the political and social arena" (**Zugasti-Hervás**, 2022, p. 141).

The crisis of masculinity is the cliché of choice used to justify the reassertion of patriarchal values (**Bujalka**; **Rich**; **Bender**, 2022; **Dupuis-Déri**, 2012), one of the tropes that provides greater "cross-pollination" between the masculinist, neomasculinist, and anti-feminist subcultures of the Manosphere (**Nagle**, 2017). The patriarchal past, mythologized and structured around the traditional division of roles and existing inequalities between men and women (**Kyparissiadis**; **Skoulas**, 2021; **Lilly**, 2016), is invoked to bridge the gap in a way that culture, society, economy, and politics cannot (**Vingelli**, 2019). Hence, the shared rituals of the Manosphere are structured around nostalgia for the lost privileges and consequent self-victimization of grieving men, stripped of their ancestral rights by women.

Misogynist communities reject the feminist premise regarding the structural inequality suffered by women (**Marwick**; **Caplan**, 2018), with their objective being to slow down the progress of gender equality (**Zugasti-Hervás**, 2022). In this sense, the redefinition of feminist tropes (the domination and objectification of women) is one of the weapons used against women as a whole and against the movement itself, in what **Banet-Weiser** defines as a constant struggle for power (**Banet-Weiser**, 2018).

García-Mingo and **Díaz-Fernández** (2022a, p. 77) believe that the Manosphere fills the emotional void of those men

> "who feel that they are victims of the social order based on a socio-sexual hierarchy that, in their opinion, benefits women."

Both authors identify the roots of victimhood in the idea of male disposability and the imposition of a misandry that, according to misogynists, permeates the whole of contemporary Spanish society (**García-Mingo**; **Díaz-Fernández**, 2022b).

The hypergamy attributed to women –selecting men for their ability to provide material goods and/or the best possible genetic characteristics for their offspring– is another of the arguments used by these subcultures, obsessed with the idea that feminism and left-wing political parties indoctrinate a part of the male population into renouncing their own interests (**Lacalle**, 2022; 2023b).

In the Manosphere's shared narrative, these men taken in by feminist doctrines and leftist slogans are awakened by taking the "red pill": a "philosophy" rooted in the accusation that women occupy a dominant position owing to their sexual power (**Azzolari**; **Borodi**; **Garusi**, 2021). The metaphor of the red pill, which comes from the movie *The Matrix* (Lilly and Lana Wachowski, 1999), has become the most important trope of all the rhetorical figures of speech that circulate in the Manosphere in terms of liberating men from the misandry and brainwashing of feminism (**Ging**, 2019). However, as **Van-Valkenburg** (2021) points out, this trope is not only used to express hegemonic masculinity; it is also a powerful weapon when it comes to integrating neoliberal and scientific discourses into the recruitment strategies implemented by the various subcultures. "Redpillers" use the term "bluepillers" to refer to men won over to the feminist cause and, in general, to all those who do not hate women.

The formalization of the four subcultures in the Manosphere of the English-speaking world identified by **Lilly** (2016) and **Ging** (2019), among other authors, and, moreover, revalidated in other recent research conducted in the European Mediterranean area (**Azzolari**; **Borodi**; **Garusi**, 2021; **Vingelli**, 2019; in addition to those already cited by **García-Mingo** and **Díaz-Fernández**, 2022a; 2022b, and **Lacalle**, 2023a; 2023b), forms the conceptual framework of this study. The characterization of the discourses analyzed in each of them also represents a valuable window into the mental organization behind the messages (**Caldevilla-Domínguez** *et al.*, 2022).

Despite the differences in the strategies implemented and tactics deployed by the discursive manifestation of the hatred of women, all posts share the stated objective of "reclaiming" the power, pride, and privilege of being a man, expressed through the aforementioned hostility toward feminism, criticism of liberalism, and disapproval of current gender roles (**Ebner**, 2021). As Han and Yin point out,

> "[t]he common traits are a misogynist worldview and a redefinition of masculinity in the contemporary context, with the use of different narratives about performance relying on a set of stereotypical models of masculinities" (**Han**; **Yin**, 2022, p. 14).

The following is a summary of the defining characteristics of each of the four groups mentioned (*MRAs*, *MGTOWs*, *PUAs*, and *Incels*), bearing in mind that many posts may express the distinctive features of more than one subculture or even include characteristics of all of them.

Men's Rights Activists (MRA)

The *MRA*s represent the most conservative wing of the *Men's Liberation Movement* (*MLM*), which emerged after the dissolution of the latter and transformed into an anti-feminist group. Protection of the family and terms of divorce soon became the main stated objectives of this subculture, characterized by having greater interaction with the real world than the others. Its discursive influence in the Manosphere centers around the economic precariousness in which divorces place men and the Machiavellian nature of women, who use children to obtain the best terms possible in the settlement.

Men going their own way (MGTOW)

Like *MRAs*, *MGTOWs* are men who are disappointed with what they see as a society dominated by gynocentrism; however, instead of fighting women, they tend to avoid them. Nonetheless, this subculture's discourses reflect a wide spectrum of attitudes: from renouncing sexual relations with women, or, at the very least, becoming romantically involved with them, to clinging to monogamy to avoid possible allegations of sexual abuse. The latter type of misogynists often scrupulously follow what they themselves call the Pence Principle, attributed by Randall Bentwick to Donald Trump's ex-vice president, Mike Pence, in a bestseller published in 2018 (*The Pence Principle*: *Lessons All Men Must Learn from Ford-Kavanaugh*). The Pence Principle is summarized in rules, such as never meet a woman alone, never drink alcohol at parties unless accompanied by one's own wife, etc.

Pickup Artists (PUA)

The *PUA*'s disdain for women does not differ much from the attitude of *MGTOWs*; however, instead of shunning or protecting themselves from them, they try to deceive them so as to seduce them. The governing principle of these misogynists is based on the conviction that every woman is worth as little as the others, so that, when a strategy does not work on one of them, she should be ignored, and they should move on to the next. Their "philosophy" is condensed in the book published in 2005 by journalist Neil Strauss (*The Game: Penetrating the Secret Society of Pickup Artists*), who blended in with these insiders to write the work. Converting the tactics used in seduction into formulas has led to a growing million-dollar business (courses, publications, etc.), based on the denigration of women.

Involuntary Celibates (Incels)

The *Incels* share the problems of relating to women with *MGTOWs*; however, in contrast to many of the latter's voluntary renunciation of engaging in sexual relations with women, the frustration of the *Incels* stems specifically from the difficulty in establishing romantic relationships. These "blackpillers" represent the extreme, symbolic, and systemic attitude of hatred of women (**Sugiura**, 2021), a result of their low self-esteem and physical complexes, so they embody better than any other subculture the character of the "otherless other" that **Johanssen** (2022) used to describe misogynists.

> "Incels are the (violent) manifestation of a new social order where sexuality and intimacy are signs of status and even social membership" (**Illouz**, 2020, p. 311),

notes sociologist Eva Illouz in her celebrated *The End of Love: A Sociology of Negative Relations*.

3. Method

Burbuja.info emerged in 2003 as an "Economy Forum" and achieved great fame by predicting the 2008 Spanish economic crisis, although this did not prevent it from drifting into the "craziest conspiracy theories" and "chauvinistic conversations" (**Hernández**, 2016). The narcissism of its members, who comment on any type of post in which they are mentioned; the constant confrontations with *Forocoches*, the largest Spanish forum also known for its hate messages against women; and the systematic reference to the subcultures of the Manosphere of the English-speaking world, make *Burbuja.info* an ideal place to observe the phenomenon under study.

This forum was chosen primarily due to its impact, but also to the absence of studies on it, except for those by **Lacalle** (2023a; 2023b) cited above, and to its accessibility. In relation to the latter, it should be noted that, despite being a closed space with subscription access, all its content is published openly, unlike Forocoches.

Burbuja.info ranks 35th among the most visited Spanish forums, with traffic of 7.2 million visits in November 2022, its main competitor being specifically *Forocoches* (25.8 million). Of the audience that visited *Burbuja.info* in November, 68.9% were men and 31.1% were women. By age group, the largest was the 25-34-year age group (27.3%), followed by the 35-44-year (22.0%) and 45-54-year (18.8%) age groups. Visitors between the ages of 18 and 24 years (13.9%) were in fourth place, which provides us with some insight into its potential impact among young people.[3]

3.1. Searching and data collection

Data collection was carried out through a process of web scraping throughout July 2022. To narrow down the relevant posts as much as possible, we used the advanced options of the forum's own search engine, which allowed us to locate all comments posted between January 2020 and July 2022 that included the lexeme "woman" ["*mujer*"] and to download each of the threads in which they had been posted. The data were downloaded using the *Instant Data Scraper* tool. As a result of this process, 118 different threads were collected, which included a total of 4,281 messages: 962 posted in 2020, 1,202 in 2021, and 2,117 in the first seven months of 2022.

3.2. Analysis of posts

After a preliminary review of the posts, 761 messages that included some expression of dislike, hatred, and/or contempt toward women, that is, misogynistic comments, were identified. The content of these messages was subjected to thematic analysis, a technique that allows for rigorous categorization of the data (**Braun**; **Clarke**, 2022). The analysis consisted of three stages: extensive reading, coding, and analysis:

- The exhaustive reading of the posts, following the literature review carried out, made it possible to identify differences and similarities between the posts, and to reach a consensus on the coding system (**Saldaña**, 2016).

- The coding system of the posts was structured on the basis of two supercategories of analysis: the misogynist profile and the main theme. In both cases, the categories established take the classifications and characteristics identified in previous research as a reference (**Han**, **Yin**, 2022). In relation to the misogynist profile, four groups were identified, as already presented in the previous section: *MRA*, *MGTOW*, *PUAs*, and *Incels*. The themes that make up the codebook are the following:
    - hypergamy and nonconformism;
    - infantilism and/or animalism;
    - political leftism and the institutional protection of women;
    - problems derived from divorce;
    - gender violence and fear of being reported for sexual aggression;
    - objectification of women; and
    - female infidelity and male frustration.

    In turn, coding using Excel allowed us to establish different thematic patterns and subthemes, which are developed in the following section.
    To ensure the reliability of the intercoders, the three researchers worked together, comparing and contrasting their respective codings of the same post.

- The analysis, development, and review of the themes was carried out manually, taking into account both the similarities and the diversity of the profiles, their problems, and the type of language used.

The methodology used is the successor to the netnography promoted by **Kozinets** (2015), as well as an update of other works on audience comments on Spanish television fiction (**Lacalle**; **Gómez-Morales**; **Narvaiza**, 2021; **Lacalle**; **Castro-Mariño**, 2018) and the Manosphere itself (**Lacalle**, 2023a; 2023b).

4. Results and discussion

The results of the analysis reveal the repetition of some cross-sectional themes in most of the messages analyzed, which are characteristic of misogynist discourse. However, they also reveal the existence of significant differences between some comments and others, consistent with the subcultures identified in the research that framed this study.

> Women's pragmatism in economic matters, which they prioritize above all other considerations, is one of the criticisms repeated the most in the messages

4.1. Cross-sectional themes

4.1.1. Female hypergamy

Women's pragmatism in economic matters, which they prioritize above all other considerations, is one of the criticisms repeated the most in the messages[4]:

> "You've hit on the key word: SELF-INTEREST. A chick is genetically programmed to look for the best possible male, which means that, when she is with you she doesn't stop looking for him; it is a relationship of total and absolute self-interest."

Some messages from this group link hypergamy with a female need to spend impulsively, to splurge:

> "A guy who has a girlfriend won't save a cent, another problem for a guy who wants to save and escape the rat race. There is a contradiction between tasting pussy and saving money, the two things are incompatible."

4.1.2. Infantilism and animalisation

Constant nonconformity is another trait attributed to women by the different misogynist subcultures. While it is true that this nonconformity may stem from multiple issues (for example, the lack of help they receive from men when it comes to household chores and childcare), the messages state that men's low spending power is a determining factor, which is where the constant reference to hypergamy comes from. Moreover, women never seem to be satisfied with what they have, as they are capricious, pretentious, and egomaniacal creatures, who want everything for nothing. This is a space of "infantilization of women": WOMEN = CHILDREN and their actions never have consequences.

Some posts adopt a pseudobiological perspective to argue that their intellectual maturation process ends much earlier than that of men or even that it does not take place at all, so they do not know what they want or suddenly change their

minds. This widespread conviction is particularly problematic because of its repeated use as a justification for harassment or abuse:

> "They don't know what they want; some of them invite you straight to their house, you screw her, and the next day she tells you that you're not her type or, worse, that she didn't want to. The situation is complicated."

> ‘ The recourse to infantilism and/or female animalism is designed to portray women as beings who are devoid of conscience and/or who are hysterical, as opposed to men –logical, rational, and superior '

Some posts suggest "animalizing" a woman:

> "you have to treat them a bit like dogs: first tame them and then keep them on a short leash."

Other messages rule out the possibility of "domesticating" women and compare them to small, dim-witted, and supposedly unsympathetic animals, such as chickens. In the sexual arena, on the other hand, they are equated to monkeys to reiterate the idea that they "use" men and do not leave them until they have found a better one ("women are like monkeys, they do not let go of a branch until they have another one in their grasp"). As for physical appearance, there is no shortage of posts that use coarse humor in which plus-size women are compared to big animals, such as cows, orcas, or seals.

In any case, the recourse to infantilism and/or female animalism is designed to portray women as beings who are devoid of conscience and/or who are hysterical, as opposed to men –logical, rational, and superior:

> "Genius is a path of total solitude, and that is why it is reserved for men (a woman would never get there)."

Some posts even go so far as to equate women with animals in a perverted way, with the aim of associating women's rejection with immorality and depravity.

4.1.3. The political left and female privilege

Another inexhaustible source of criticism is the privileges granted by leftist political parties to women. It is also the main argument used to advocate against unprecedented discrimination experienced by "heterosexual white men:"

> "The globalist social engineering that is being carried out with the pervasive hypersexualization of Western societies is solely aimed at the total destruction of the heterosexual white man."

Numerous messages are devoted to defining and enumerating the advantages of being a woman in Spain today: access to public employment through a special quota for being a woman, incentives for companies to hire women, specific subsidies for self-employed women, sick leave for painful menstruation, positive discrimination on physical tests to do certain professions, and free training courses, among others. As a result, the incorporation of women into the labor market has produced widespread unease. This is because it implies that women have become rivals for job opportunities and that they do not compete fairly owing to the privileges granted to them by the left, and, on the other hand, incorporating them into the labor market also involves working with them, which adversely affects men because women have lower productivity and, in the end, men would end up doing all the work:

> "Women parasitize men's work in a pleasing way through seduction or in an aggressive and a nasty way through feminazism. In an awful communist State like this one, the woman parasitizes the man with the help of the public authorities."

Posts claim that this low female productivity results from constant conflict among women:

> "There is no worse work environment and no more despotic superiors than women. Freeloaders, useless by nature, playing the victim, with no concept of teamwork and workplace unity, selfish ... They are the cancer of the company."

Thus, sisterhood is portrayed as a fabrication of feminism, since women are incapable of having healthy relationships with each other. They argue that women should not be part of the job market and that they should stay at home:

> "Why do you think that women have been at home for centuries, our ancestors were assholes? Well, they hadn't learned from experience and knew what was up, but we modern people want to think we know better."

Feminism is depicted as an "absurd doctrine" of which women are the victims because, as inferior beings, they can be duped more easily:

> "Deceived from a very young age by the elites into thinking that 'working frees and empowers you' after a few years treading water and eating shit, the few smart ones learn the lesson."

Posts of this type also tend to criticize the "allies," the female-dominated men:

> "It is incredible how Spanish men have changed in just a single generation, before we had balls and only a mother told you what you had to do, years and years of simp guys landed us with a society in which women dominate but play the victim, and the guys? They support them."

The messages are also very critical of men who support feminism, calling them "bitch boy" ["*pagafantas*"], "wimp" ["*blandengues*"], "pansy" ["*parguelones*"], "wuss" ["*calzonazos*"], "pantysniffers" ["*huelebragas*"], and even emasculating them through the term "mangina" (a portmanteau of "man" and "vagina"):

> Numerous messages are devoted to defining and enumerating the advantages of being a woman in Spain today

> "A Mangina is a self-deprecating man who unconsciously hates himself and blindly believes that women are superior to him."

4.2. Specific topics

4.2.1. *Men Rights Activists* (*MRA*)

This subculture's anxieties are the main theme of 11.0% of the posts, although they also filter into a good number of messages focused on other topics, such as female hypergamy or the consequences of the current Spanish government's institutionalized feminism. This set of posts insists on the idea that, after a breakup with or without children in common, women have the privilege of staying in the family residence, whereas men are "kicked out" of the home and are forced to pay alimony even if their economic situation does not permit it ("No judge gives a shit if there is money left for rent or food, gasoline"). The high number of messages from this group that reflect a serious worry about the possibility that the woman's new romantic partner may move into the family residence is striking:

"the woman stays in the house, and within 3 months her new partner enters, who prefers the house bought with your savings and/or you're still paying for!"

On the contrary, no posts show irritation at the inability to live with their own children or spend more time with them. In some cases, paternity is even questioned:

"it is possible that the child is the neighbor's, but it is forbidden for you to take a paternity test."

A good number of posts on the problems arising from separation blame the situation in which these men find themselves on false reports of gender violence and excessive state protection for women:

"I have LIVED this in the form of people in my family and friends 2 TIMES. Both times it was like this: First time: 'Either I keep the house, or I sue for abuse' [...]. Second time: 'Either I keep the house or you've raped me'."

Although there may be many reasons for a separation/divorce, users state that these are mainly due to the woman's dissatisfaction with the man's decrease in or absence of economic income:

> "Spanish women, as soon as their husband sinks down –in economic terms– begin with the reproaches, the insults, and in the end they end up leaving them for being failures who do not live up to what they deserve."

Some posts even go so far as to claim that women abandon their husbands because, once they've reached motherhood and economic stability is assured, they no longer need them.

4.2.2. *Men Going their Own Way* (*MGTOW*)

Posts on sexual violence, false allegations, and the lack of the presumption of innocence are the central themes of 16.3% of the messages analyzed. This group of posts tends to deny the official data, which they call inaccurate, and claim that false accusations are widespread and lead to statistical overrepresentation of women as victims of sexual violence. They also claim that the figures are biased, as they believe that both "sexual violence" and "domestic violence" are not exclusively female problems:

> "I only put what I find, but there is a legit mountain of corpses every week in Spain due to women."

Some posts even suggest that there is a conspiracy against men:

> "Murders have been around as long as human beings have existed. The thing is to solve them quickly and prosecute the person responsible in order to punish them. Nothing else needs to be done. But HERE IT'S ALL ABOUT FUCKING WITH MEN."

In discussions about femicides, messages suggest that the "real" reasons for the death are always unrelated to gender-based violence:

> "The death of a woman at the hands of some tough guy she hangs out with is not murder, it is suicide."

Yet, a small number of comments even justify violence against women:

> "I thought I would commend him by uploading a video on my instagram where I advise women to keep their husband or boyfriend happy and satisfied if they don't want him to beat them for fleecing them and keep them on bread and water."

The fear of being exploited by a woman often leads to a self-protection strategy based on emotional and sexual detachment from women by renouncing the role of husband, boyfriend, father, or resource provider:

> "We have to learn to be self-sufficient, and emancipate ourselves from the tutelage of a woman, to be aware that we have value on our own, independent of female validation, which is frivolous, selfish, changeable and self-serving, and of the dependence that women seek to create in us, with the aim of putting us at their mercy."

'Feminism is depicted as an "absurd doctrine" of which women are the victims because, as inferior beings, they can be duped more easily'

In the same vein, some posts discredit and mock men who still long for a relationship with a woman:

> "A lot of complaining, but many of you are partnered up with a woman. If that pisses you off, I'll even be happy about it. You deserve nothing less. [...] You're gyno-codependent shits, and I'll laugh a thousand times over at the shit you waste. Screw you."

In other cases, however, alternatives for satisfying their sexual/reproductive needs are proposed in which women are completely dispensable:

> "Yep, as soon as they invent a suit/machine that can connect to a computer and reproduce the sensations of being with a woman, the human species will go extinct in a couple of generations."

The posts defending the legalization of surrogacy demonstrate extreme hatred, expressed through the use of profanity:

> "But what the fuck are you talking about? There is no such thing as an alpha woman. And, look, the alpha male seems to me an idiot with a good view of stupidity. An inferior being because of their gyno-codependency [...] Your only reason for being is sex, but you suck at that, and you are useless when it comes to that. You are scum in a state of fucking filth."

4.2.3. *Pick Up Artists* (*PUA*)

Hate messages related to utilitarianism put seduction before any ideological, ethical, or philosophical ramifications of achieving that goal. Thus, these posts (9.6%) defend the original "method," that is, a set of aggressive seduction techniques that do away with the boundary between consent and active harassment:

> "You are the master. That's right, a real man should pursue the woman. And in a way that feels insistent and acts and adapts accordingly."

Some arguments use a pseudoscientific packaging to make them effective:

> "It is based on the brain morphology of women, more neural connections between lobes than men, but less activity and 'intralobular' neurons. They have a hard time keeping reasoning in their heads, so they can be easily manipulated."

In other cases, on the contrary, they recommended feigning disinterest as a winning tactic:

> "Really important: demonstrate that you don't need any of them. But it is not enough to fake it. You have to really live it. Give up any intention of flirting ahead of time. Make up your mind that you are not interested in flirting. Look, this does not mean joining the *burbumori* brotherhood of guys who can't get laid and *Incels*. In fact, it's the opposite." (where "burumori" describes the community that uses the website studied herein)

The conversations that facilitate seduction even make use of apparently contradictory reasoning, based on portraying women as creatures as detestable as they are desirable. To all appearances because, in reality, the dichotomy is reconciled by objectifying women; reducing them to objects that affirm their male privilege and their "erotic capital" in the sexual market. In other words, they become trophies:

> "A man with balls and self-esteem knows he's a fucking star and a valuable commodity that is in high demand, and they line up to have sex with him."

This type of affirmation masculinity is also characterized by claiming that a woman's value to a man is inherently linked to her physical attractiveness. Hence their propensity to open threads dedicated to making rankings of, for example, "the most fuckable female celebrities," "the most screwable actresses," or "female celebrities who were bangable in the nineties."

4.2.4. *Involuntary Celibates* (*Incels*)

Male frustration is the main theme of the posts related to the characteristics of the *Incels* (19.4%). However, although users seem to explain their experience with the sole purpose of finding support and being part of a community of peers, other messages also show a violent response to the rejection of women, paradoxically accusing them of being both frigid ("because despite what the social engineers of the system sell us, women do not have a real compulsive need for sex, unlike men") and promiscuous ("Women have whorishness in their DNA").

An aggressive tone and vulgarity characterize much of the group of posts related to the Incel subculture, which even tend to justify the use of violence. On the one hand, they justify physical violence against women as a form of punishment

> "I just want people who do not respect the natural law to be treated as they deserve to be treated and if the sluts of today need to be slapped, then they'll get it."
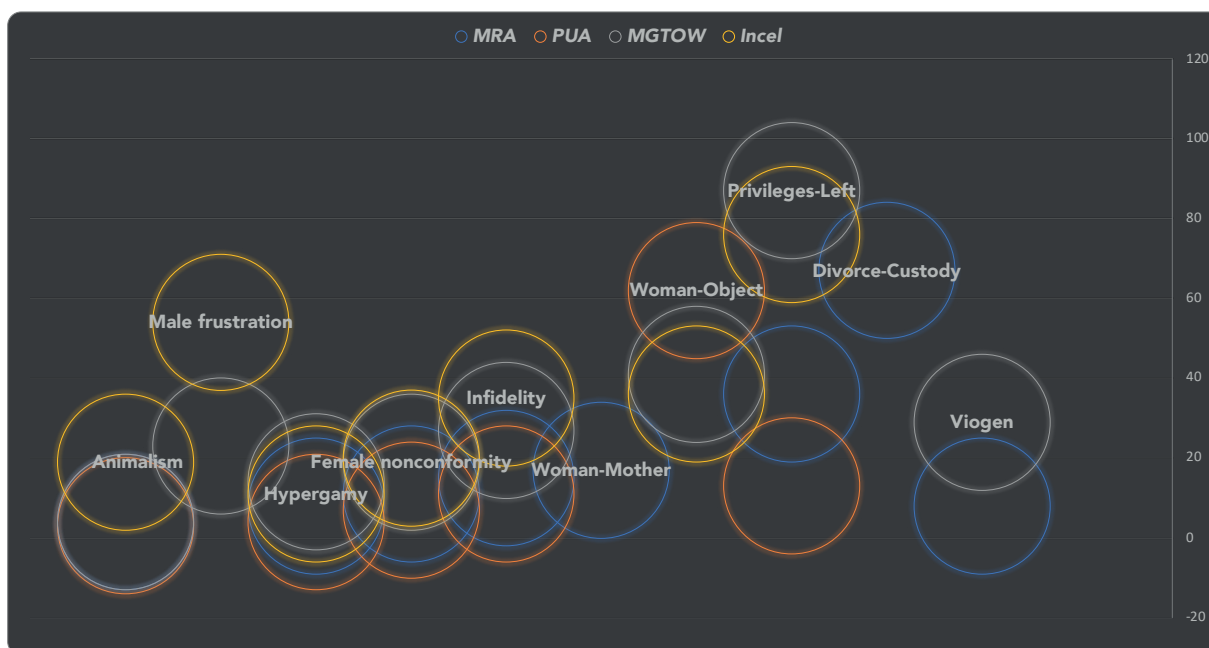
Figure 1. Configuration of topics of misogynist posts on *Burbuja.info*

On the other hand, they trivialize sexual violence by saying that women really desire it, even going so far as to attribute their own sexual fantasies to them:

> "I'd go with the part where you're underneath her while she has a big black cock destroying her ass. It's impossible for a woman to get more pleasure."

These fantasies unequivocally refer to the main topics of pornography, which seems to be their primary source of information about female pleasure. Regarding this last point, it is essential to point out that obsession with sex is a defining feature of this misogynist profile, which is very apt to see sexual connotations everywhere. Hence, a large portion of the posts only refer to sexual behavior and do not relate to the discussion topic at all.

5. Conclusions

This analysis confirms the main findings of research on hate speech against women, in terms of both the themes and topics characteristic of misogyny and the reasoning of the comments. Hypergamy, objectification, and the disparagement of the world of women are recurring tropes, to which must be added criticism of feminism, left-wing political parties, and, therefore, the current left-wing government. Among the contradictions that emerge in the study, the oft-repeated contradiction between frigidity and promiscuity attributed to women –one of the most prevalent manifestations of the Freudian virgin-whore complex– stands out. Another recurring paradox is the desire to push them out of the professional sphere to perpetuate their dependence on men while accusing them of destabilizing men economically.

The social identity attributed to women that surfaced during the analysis –utilitarian, ignorant, and privileged– contrasted with the victimhood that exuded from most of the comments. In this sense, it can be said that the "crisis of masculine identity" is narratively constructed in the messages. In this sense, it can be said that the "male identity crisis" is narratively constructed in the messages of *Burbuja.info*:

- men immolated by the unfavorable conditions of divorce;
- by the constant threat of being accused of gender violence;
- by the contempt they are subjected to by women;
- by the defenselessness against social and institutional privileges granted to the female sex...

And a long etcetera that is only interrupted by the dissonant voices of the *PUA*, who recommend to their fellow men to seduce women at any price: turning them into objects to be used and thrown away.

Although the intensity of the hatred varies significantly from one commentary to another, all of them explicitly express a deep contempt for women. This evidence is compatible with the characteristic animosity of the Manosphere, a prime example of a culture of anonymity in which users can air their darkest thoughts with impunity, as **Nagle** (2017) noted regarding *4Chan* blogs. The discursive and repeatedly stated contempt suggests that the low number of posts inciting violence could be due to the strict control exercised by those responsible for the forum, in accordance with the warnings made in the "Terms and rules" section of the blog: "We reserve the right to remove or modify any Content posted for any reason without explanation."
https://www.burbuja.info/inmobiliaria/help/terms/

The results obtained demonstrate the unequivocal similarities between the major misogynist subcultures of the Manosphere described in international research (*MRA*, *MGTOW*, *PUA*, and *Incels*) and the different profiles identified in the misogynistic posts on *Burbuja.info*. This fact, along with numerous posts explicitly referencing said groups (**Lacalle**, 2023b), explains the persistence of a monotypic narrative in which the only way to respond to the "crisis of masculinity" is to punish the villain-woman, as **Palma** (2020) states in relation to the *Incels*, in the most degrading messages.

> "Misogyny is spread through a set of tactics aimed at undermining women's growing role in social life and their institutional visibility"

Although the textual nature of the analysis does not enable us to establish exact correlations with the real world, it is essential to very seriously consider how misogynistic posts on the Manosphere engender violence against women and vice versa –a bloodletting that neither Spanish society nor the institutions nor the politicians have successfully curbed despite public condemnation and actions aimed at eradicating it. A "holistic, longer-term approach based on an alliance across different sectors and political parties" (**Ebner**, 2021) is therefore required. Politicians, technology companies, social workers, educators, and civil society are called upon to coordinate their efforts in this enormous undertaking.

To summarize, it can be concluded that, in the messages analyzed, misogyny is spread through a set of tactics aimed at undermining women's growing role in social life and their institutional visibility. The tropes utilized and the intensity of the hatred expressed defined four subcultures comparable to four expressions of toxic masculinity.

6. Notes

1. See *My Twisted World The Story of Elliot Rodger*, at
https://s3.documentcloud.org/documents/1173808/elliot-rodger-manifesto.pdf

2. See, for example, *A voice for men, created in 2009.*
https://avoiceformen.com/

3. Data provided by *Similarweb*, a company specialized in website traffic and performance.
https://www.similarweb.com/es/website/burbuja.info/#geography

4. In the Spanish version of this article, all of the posts on *Burbuja.info* included as examples have been transcribed verbatim, maintaining the errors (typographical, spelling, syntactic, etc.) made by their writers.

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Rethinking a national classification of research and graduate education

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Abstract

Brazil adopts a classification system of research and graduate education that is key to its high-stakes national evaluation. Originated in the 1970s, the system is organised around evaluation areas that have expanded and matured not only to support the evaluation dynamics in the country but also to address the immense growth of the *National System of Research and Graduate Education* (*SNPG*). This study investigates the origins, evolution and current profile of the Brazilian classification, identifying that five decades of expansion led the system to become somewhat peculiar, especially when compared with international classification systems such as the *OECD Fields of Research and Development* (*FORD*) and the *Unesco International Standard Classification of Education* (*ISCED*). The investigation and the comparisons conducted reveal that the system needs to be revised. For that, the study advances to propose a scientometric approach to rethink not only the classification of evaluation areas but also the allocation of research and graduate programs within them. The methods explored in this paper show the potential of the approach, as the different analyses performed can provide evidence to expert committees in the challenging task of performing an evolutionary review of the adopted classification system.

Keywords

Classification systems; Scientometrics; Science policy; Research evaluation; Graduate education; Brazil; *OECD Fields of Research and Development* (*FORD*); *Unesco International Standard Classification of Education* (*ISCED*); Evolutionary review.

1. Introduction

The Brazilian science system exists primarily within graduate programs (PPG), composed of master's and doctoral levels. This design was not an accident, but a consequence of a science system that did not develop spontaneously; it was the object of public policy that prioritised the link between research and education. Most of that effort took place from the 1950s, initially by shaping the system and then towards its expansion (**Balbachevsky**; **Schwartzman**, 2010; **Brasil**, 2020). One of the key strategies adopted was to implement a scholarship system to allow Brazilians to pursue degrees abroad, with the aim of building critical mass to materialise the country's graduate education (*CNPG*, 1974; **Gouvêa**, 2012).

> One of the key strategies adopted was to implement a scholarship system to allow Brazilians to pursue degrees abroad, with the aim of building a critical mass to materialise the country's graduate education

In the early 1970s, the number of scholarship holders from the leading agency in charge of funding the research and graduate system in the country, *CAPES*, was significantly small. The agency's grant report from 1971 revealed that only 1831 scholarships were awarded for graduate students in the country, and an additional 134 were granted to study abroad. Because of the manageable numbers, scholarships were handled mainly by a deliberative council that would analyse candidates in the face of the available funding. According to Darcy Closs, *CAPES*' executive director from 1974 to 1979, this process was particularly challenging, as many national figures would pressure the council to award grants to proteges (**Castro**; **Soares**, 1983; **Córdova**, 2001; **Ferreira**; **Moreira**, 2002).

To avoid lobbying, *CAPES* sought inspiration from the peer review experience of accreditation agencies in the United States. The first effort in Brazil, still in 1974, consisted of the installation of a single peer review committee with a small group of experts from broad areas such as engineering and social sciences. Academic merit would guide decisions on scholarship distribution, and the list of awardees would be submitted to the minister of education for endorsement. The task at hand was beyond the certification of the results, as the real challenge was neutralising the complaints of influential people who had their requests denied. Reports on the initiative of the advisory committee acknowledge that positive results were only possible due to the performance of the minister in protecting the newly established merit system (**Ferreira**; **Moreira**, 2002).

However, the single committee would not be able to keep up with the number of scholarships granted every year, which grew more than 400% in less than a decade (**Castro**; **Soares**, 1983). Therefore, two significant changes were implemented:

(i) The evaluation evolved to an institutional model, where *CAPES* would assess graduate programs instead of individual candidates, granting a quota of scholarships to the programs based on performance. Then, the PPG would distribute the scholarships based on internal criteria;

(ii) The original advisory committee was transformed into a series of disciplinary committees, which multiplied according to the growth of graduate programs and consequent increase in demand (**Córdova**, 2001; **Ferreira**; **Moreira**, 2002).

According to the most recent official reports, in early 2021, there were 4691 graduate programs active in Brazil, and *CAPES* granted around 95.000 scholarships for master's and doctoral courses in the country and 4500 for study and research abroad. The distribution of these scholarships is still heavily based on the evaluation performance of graduate programs, with a system organised around 49 evaluation areas, developed from the original disciplinary peer review committees (*CAPES*, 2020c; *CAPES*, 2021d).

This study looks at the current evaluation areas and analyses whether a reorganisation may be necessary. For that, we consider three different perspectives:

(i) the dynamics of the expansion of evaluation areas and the observed inconsistencies in how they are organised;

(ii) an international comparison of classification systems of research and education;

(iii) a recommendation from a special committee in charge of monitoring the *Brazilian National Plan for Research and Graduate Education* (*PNPG*)[1]. Finally, after identifying weaknesses in the structure of the Brazilian evaluation areas, the study advances to propose a scientometric approach to rethink such areas and the distribution of graduate programs within them.

2. Evaluation areas and their roles

Evaluation areas are a core component of the established evaluation system in Brazil. Each area counts with its peer review committee, coordinated by representatives appointed by graduate programs in each discipline and nominated by *CAPES* for a four-year term. The coordinator's work is supported by two deputies, one for academic and the other for professional programs. Although broader regulations guide national evaluation, each area has some freedom to determine specific criteria and indicators in its analyses (*CAPES*, 2016a). For instance, as described in a previous study, areas can choose which types of technical and technological products should be recognised as appropriate research outputs valued by the committees in the evaluation process (**Brasil**, 2021).

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The configuration in 49 areas also plays a pivotal role in the organisation of the science system. Accreditation of new graduate programs is mandatory in the country. Once a proposal is approved, the new PPG becomes part of the corresponding area, subject to their specific evaluation criteria. Additionally, every four years, accreditation must be renewed in a national evaluation that is comparative within each area. PPGs are graded on a scale of 1 through 7 based on how well they perform compared to the overall performance of the other programs in the same areas (**Brasil** *et al.*, 2022; *CAPES*, 2021c).

> "The evaluation evolved to an institutional model, where *CAPES* would assess graduate programs instead of individual candidates, granting a quota of scholarships to the programs based on performance"

The evident relevance of the evaluation areas is established even in related legislation, where they are given the responsibility to guide *CAPES*' programs and courses of action (*CAPES*, 2016a). Table 1 shows *CAPES* evaluation areas, with unique identifiers in parentheses, aggregated into the nine broad areas and three upper groups adopted by the agency (*CAPES*, 2020d).

Table 1. *CAPES* evaluation areas according to their respective broad areas and upper groups

Upper group	Broad area	Evaluation area
Exact Sciences	Engineering	Engineering I (10), Engineering II (12), Engineering III (13), Engineering IV (14)
	Exact and Earth Sciences	Astronomy and physics (03), Chemistry (04), Computer science (02), Earth sciences (05), Mathematics and statistics (01)
	Multidisciplinary	Biotechnology (48), Environmental sciences (49), Interdisciplinary (45), Materials science (47), Teaching and learning (46)
Humanities	Applied Social Sciences	Architecture, interior and industrial design (29), Business and administration, accounting, and tourism (27), Economics (28), Journalism and information (31), Law (26), Social work (32), Town planning and demography (30)
	Humanities	Anthropology and archaeology (35), Education (38), Geography (36), History (40), Philosophy and ethics (33), Political Science and international relations (39), Psychology (37), Religion and theology (44), Sociology (34)
	Linguistics, Literature & Arts	Arts (11), Literature and linguistics (41)
Life Sciences	Agricultural Sciences	Agricultural sciences (42), Food science and technology (25), Veterinary medicine (24), Zootechnics and fisheries (23)
	Biological Sciences	Biodiversity (07), Biological Sciences I (06), Biological Sciences II (08), Biological Sciences III (09)
	Health Sciences	Dental studies (18), Medicine I (15), Medicine II (16), Medicine III (17), Nursing (20), Nutritional science (50), Pharmacy (19), Physical education, therapy, and rehabilitation (21), Public health (22)

Although the names of some evaluation areas shown in Table 1 are very descriptive, such as "Environmental Sciences" or "Computer Science", others are more difficult to understand unless subareas or specialities are considered. For example, *CAPES* (2020d) shows that electrical and biomedical engineering are subareas included in "Engineering IV", and that "Medicine I" aggregates specialities such as oncology and cardiology.

In addition to cryptical names, some areas combine broader sets of disciplines with different levels of affinity for their objects, cognitive methods, and instrumental resources. A significant example is in "Anthropology and Archaeology", combining disciplines in a single evaluation area under the broad area of "Humanities". The *American Academy of Arts and Sciences*, for instance, considers archaeology to be part of the humanities, and anthropology to be a social science, despite recognising its humanistic perspective (*AAAS*, 2022).

In other occasions, some proximity appears to exist, like in the case of "Architecture, Interior and Industrial Design". However, a comparative evaluation here becomes harder to perform due to quite distinct citation practises in those disciplines. The evaluation area system designed by *CAPES* evolved over time, in part following the "cognitive" approach described by **Glänzel** and **Schubert** (2003), where areas can be iteratively defined according to the experience of those involved, in this case the agency's experts and committee members. However, *CAPES* (2020d) states that the area classification also has an eminently practical purpose, aiming to provide research units with a functional way to report their activities to the science and technology agencies in the country. As a consequence of the administrative component involved in the delimitation process, an unnatural delimitation of areas becomes evident in the literature, for instance:

(i) **Dias** *et al.* (2017) reviews the process in which the area "Teaching of Science and Mathematics" was created from the existing "Education" area. According to the authors, the new area was the consequence of a long political movement within the original area, where a group of researchers could not find autonomy and recognition. Their work focused on applied research toward improving the training of human resources, for all levels, through the improvement of teaching

> "Evaluation areas are a core component of the established evaluation system in Brazil"

methods. Aiming to strengthen the connections between science and society, *CAPES* supported the creation of the new area, leading to a clear division of applied research in "Teaching of Science and Mathematics" and the more conceptual and theoretical research in "Education". Two decades later, the areas have evolved towards better integration of academic and professional research, and the borders between the areas are no longer clear. As a consequence, their leaders have been calling for either a redesign of the areas or their unification.

> Those stories show how the Brazilian classification of evaluation areas was created with a purpose, and that its development aimed to address issues such as the expansion of the country's research and graduate education system, and the evolution of science

(ii) *CAPES*' ordinance nº 83 (2011) renamed the "Teaching of Science and Mathematics" area to "Teaching".[2] The ordinance also created other areas such as "Environmental Sciences", with research programs migrating from existing areas. However, an analysis of *CAPES*' database of existing programs in the "Interdisciplinary" area (*CAPES*, 2021b), for example, reveals that there are several PPG in that area that did not migrate to the new area, despite obvious connection. Some PPG in the "Interdisciplinary" area are even named "Environmental Science".

(iii) **Stern** (2019) describes how the areas of "Philosophy and Ethics" and "Religion and Theology" were created in 2016 from the division of a single area. The author reports that, despite the epistemological differences between the areas, it took more than a decade of negotiations to achieve the desired separation. Ultimately, the new areas were only created after a political crisis: during the election of the coordinator of the original combined area, all research programs in "Religion and Theology" unified to support a single candidate, while no consensus was found within the "Philosophy and Ethics" ones. The philosophers called for *CAPES* to annul the election, which was denied, but that gave traction for the separation to finally happen.

Different types of stories can be told about how new evaluation areas have been created, and others have been combined or restructured over time. Those stories show how the Brazilian classification of evaluation areas was created with a purpose, and that its development aimed to address issues such as the expansion of the country's research and graduate education system, and the evolution of science. However, the main challenge regarding the *CAPES*' classification can be described by **Glänzel** and **Schubert** (2003, p. 1), who said that

> "after many centuries of constructive but yet inconclusive search for a perfect classification scheme, the only sensible approach to the question appears to be the pragmatic one: what is the optimal scheme for a given practical purpose?"

From this perspective, the main purpose of the classification system adopted by *CAPES* has been the evaluation of graduate programs in the country. Linked to this primary goal is the allocation of funding in a comparative perspective within each area, relying on metrics which often fail to capture the variation of disciplinary practises. Furthermore, the classification is also relevant to analyse the evaluation of the Brazilian science system in the international scenario, which also determines funding distribution.

3. The Brazilian classification compared

Assessing Brazilian science from the *CAPES* classification is particularly challenging, as adjustments made in the model to address local peculiarities have led to a significant mismatch with other classification systems, such as the *OECD Fields of Research and Development* (*FORD*) and the *Unesco International Standard Classification of Education* (*ISCED*). Some of these inconsistencies are visible in Figure 1 and Figure 2, where broad areas adopted by *CAPES* were matched with the broad classifications of *FORD* and *ISCED*. For that, a multilevel analysis was performed based on areas, subareas, and specialities for the three systems (*CAPES*, 2020d; *OECD*, 2015; *Unesco*, 2015).

Figure 1 shows the nine broad areas in the *CAPES* classification system on the left, with numbers representing the evaluation areas. Fractional numbers can be seen in the *FORD* part of the Sankey chart, as the areas or sub-areas of the Brazilian system may be divided into different groups as defined by *OECD* (2015). For the broad group of Biological Sciences, for example, some subareas of "Biological Sciences III" fit into "Medical and Health Sciences" (for example, immunology and parasitology) and others belong to 'Engineering and Technology' in the *FORD* schema (e.g., cell & tissue engineering).

Another distinction between the two systems connected in Figure 1 is related to the social sciences and humanities, as inconsistencies can be seen in the distribution of groups among classifications. For instance, more than half of what *CAPES* considers part of the humanities is

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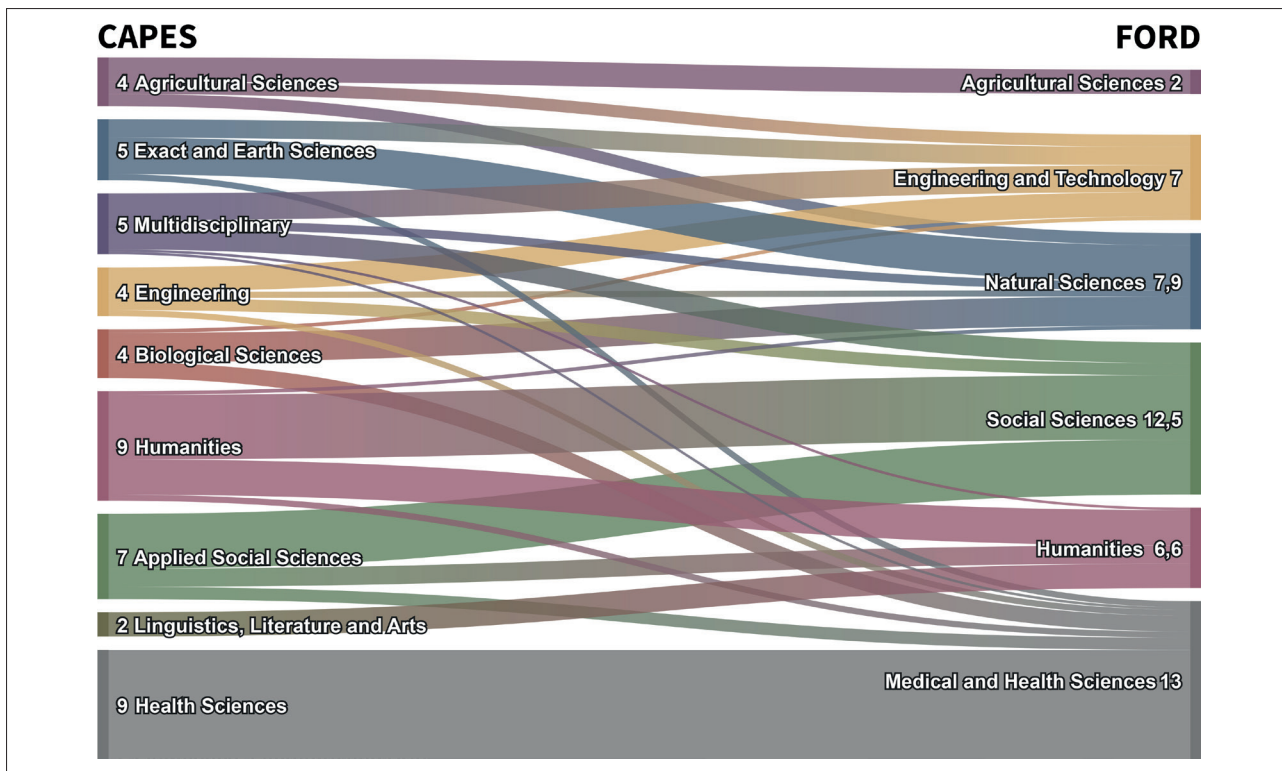
Figure 1. *CAPES* broad area relations with *FORD*'s broad classification.[3]

classified as social sciences by *FORD* (e.g., political science and psychology). One could argue that the observed conflicts may come from the design of the Brazilian system with graduate education in mind. However, such mismatches in SSH are also visible in Figure 2, where the broad areas of *CAPES* relate to the *ISCED* classification.

The *ISCED* groups are significantly different from the *FORD* ones, especially due to broad classifications such as "Services", "Education", and "ICTs". Once again, the connections between the SSH disciplines are very inconsistent. Additionally, the *CAPES* multidisciplinary broad area has a small connection to nearly all *ISCED* groups, as the system counts with a specific code in each group to include interdisciplinary programs and qualifications. Therefore, many of the different graduate programs within the *CAPES* "Interdisciplinary" evaluation area find a specific home within the *ISCED* classification.
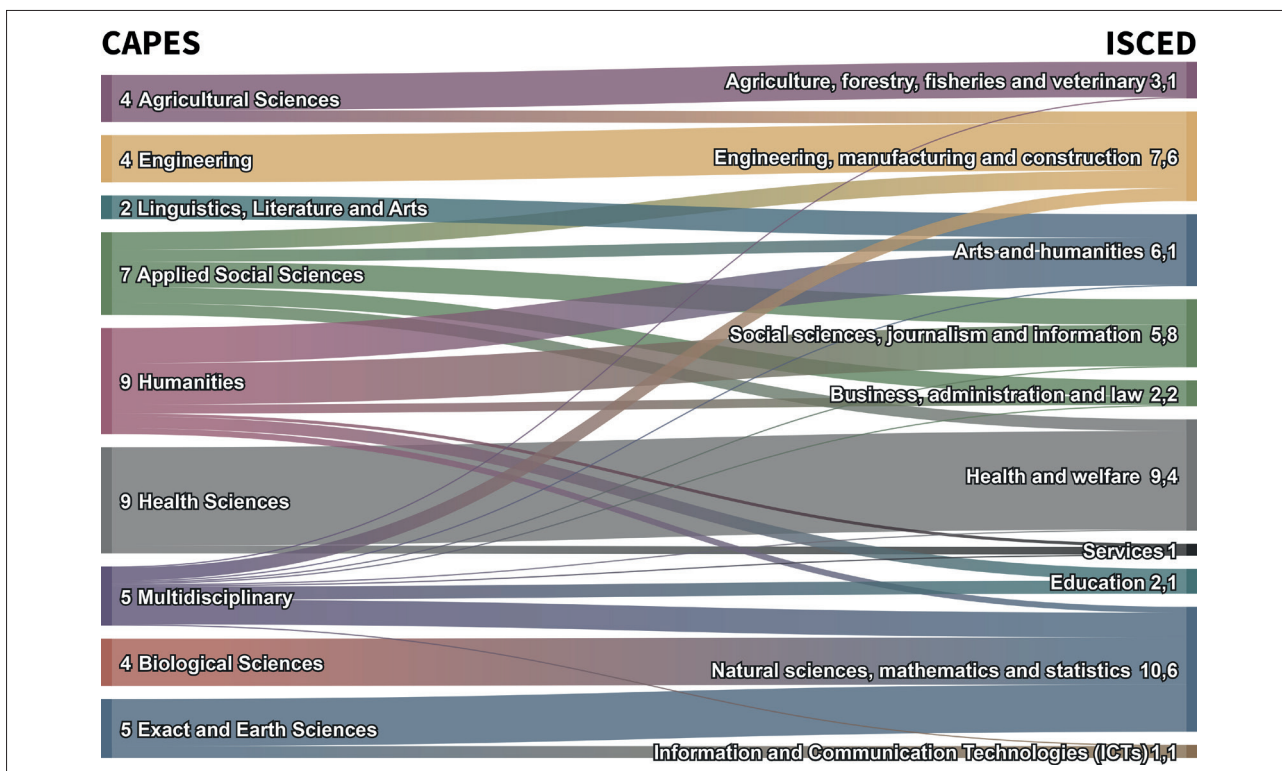
Figure 2. *CAPES* broad area relations with *ISCED*'s broad classification

4. Rethinking the Brazilian classification

The differences between the main classification system adopted in Brazil and alternatives such as *FORD* and *ISCED* are a problem for the country to conduct comparative studies on funding allocation, research dynamics in countries and disciplines, scientometrics. Although matching classification systems at their most granular levels –like what has been done for this paper– can help conduct some of the types of study mentioned, it is unlikely that the time-consuming activity will be replicated widely and consistently. A solution would be to review the Brazilian classification to improve international equivalence, something also suggested by the special committee in charge of monitoring the *Brazilian National Plan for Research and Graduate Education* (*PNPG*).

Since the 1970s, Brazil has issued periodic *PNPG*s to help guide evaluation and science funding policies in the country (**Brasil**, 2020). The most recent plan covered the period 2011-2020 and the execution and results were monitored by a special committee. At the end of their term, the group prepared a report with many recommendations, including the need to rethink the current classification system, as the 49 areas do not reflect the modern panorama of science (*PNPG Committee*, 2020). Although the committee's recommendation for change is aligned with the findings of this study, there is a significant disagreement on the methods.

The *PNPG Committee* (2020) report suggests a substantial reduction in the number of evaluation areas, using the nine broad areas as a reference. However, we have seen significant discrepancies between the broad areas of *CAPES* and those of international classifications. Addi-

> More than half of what *CAPES* considers part of the humanities is classified as social sciences by *FORD*

tionally, merging areas can represent a setback to a crucial achievement for research evaluation. After decades of area expansion, peer review committees achieved a level of freedom to customise evaluation criteria to suit their practises and value their principles. Moreover, the comparative perspective of the evaluation system has value when similar PPG exist within each area, but can be damaging in heterogeneous environments. Perhaps, the most adequate approach is not aiming for numbers, but for an adequate distribution of research that can be suitable for national evaluation and funding purposes, as well as international comparisons.

A possible method for reviewing the classification system may be supported by scientometrics. To demonstrate one possibility, microdata from the 2017-2018 papers in the three "Biological Sciences" areas (BioSci) have been collected from the *CAPES Open Data System* (*CAPES*, 2021a). Information such as DOI, ISSN, authorship, volume, page numbers, etc. was used to match the publications to the *Web of Science*.

Departing from the 15.375 documents matched to *WoS*, a term map of BioSci papers was produced using the *VOSviewer* software (**Van-Eck**; **Waltman**, 2009). For that, the title and abstracts of the articles were collected from *WoS* (*Clarivate*, 2022). Binary counting was used to extract more than 280 thousand noun phrases from the corpus, of which 8161 appeared in at least ten documents. A relevance score was calculated for each of these terms, with a threshold of 60%, and the resulting 4897 terms were used to produce the map seen in Figure 3.

In Figure 3, the size of each circle represents the number of documents in which a term occurs. Proximity or distance between terms reflects cooccurrence, which also influences the creation of the five observed colour clusters.
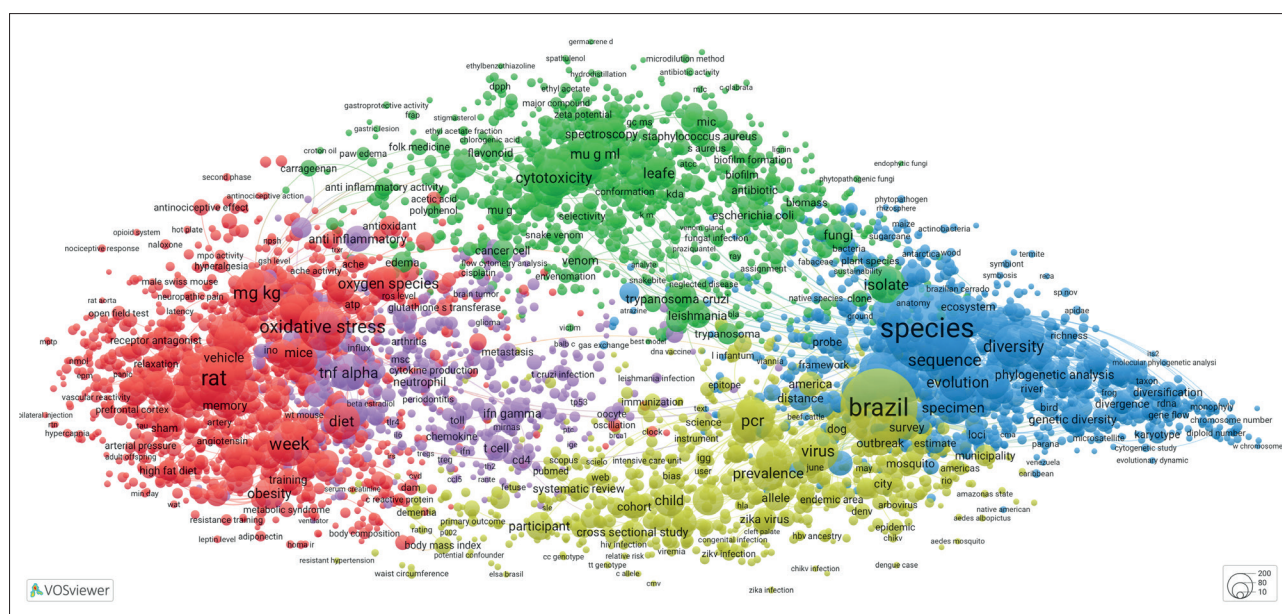
Figure 3. Term map of papers from the Biological Sciences evaluation areas (2017-2018).

(a) Biological Sciences I

(b) Biological Sciences II

(c) Biological Sciences III

Figure 4. BioSci term maps with publications highlighted per area (2017-2018)

With the term map representing the thematic publication profile of the three BioSci evaluation areas, Figure 4 adds a colour overlay to highlight publications of researchers affiliated with graduate programs in each of the areas. To improve comparability across the three areas, the scale is normalised by substracting the mean from each variable and dividing the result by the standard deviation.

The bibliometric profiles in Figure 4 are revealing. First, we notice that BioSci I (a) and II (b) operate on opposite sides of the term map, showing that the areas focus the majority of their attention on specific research interests. Regarding BioSci III (c), the area operates towards the middle of the map, slightly overlapping BioSci I, but with greater attention to issues such as parasitology and immunology and with greater focus on issues of regional interest (observed in the 'Brazil' cluster). Although an expert committee could reach more robust conclusions from the maps provided, deciding whether the three areas need adjustment, the bibliometric perspective indicates that the research outputs of each area align with their associated subareas and specialities listed in the *CAPES* classification document (2020d).

Another application of term maps, as seen in Figure 5, is to focus on the profiles of individual graduate programs and how their research compares with the broader map of BioSci research.

Figure 5 displays publication profiles of two graduate programs in each of the Biological Sciences areas. The term maps shown on the left (a, c, and e) are from graduate programs whose profiles fit within the publication topics shown in Figure 4 for their respective areas. However, the maps shown on the right (b, d, and f) are examples of PPG profiles that may be more well suited for a different BioSci area.

It would be feasible to consider the profiles seen in Figure 5 as evidence to support the migration of some of these programs to different areas that would be more suited to their research profiles. However, the proposed approach should

(a) PPG 32001010175P5 – BioSc I
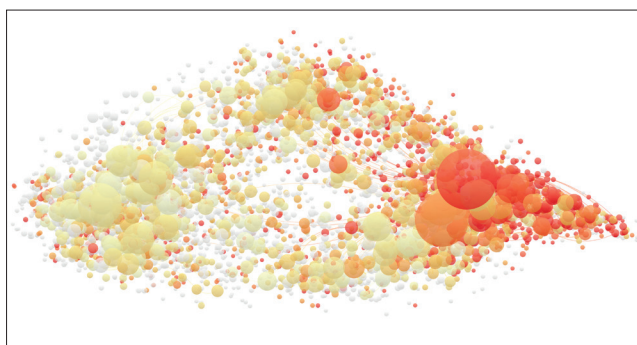
(b) PPG 32001010068P4 – BioSci I
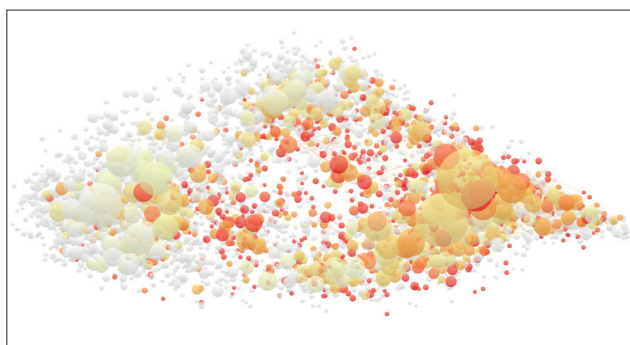
(c) PPG 42002010023P9 – BioSci II
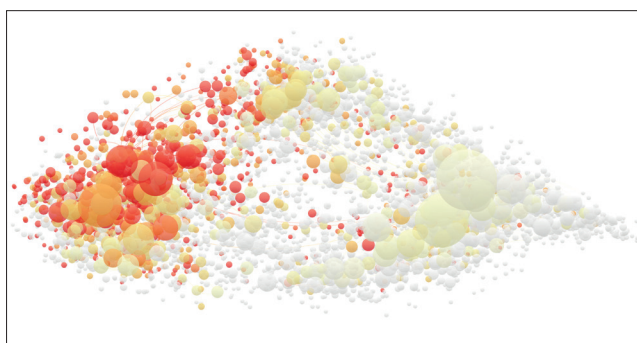
(d) PPG 31010016004P9 – BioSci II
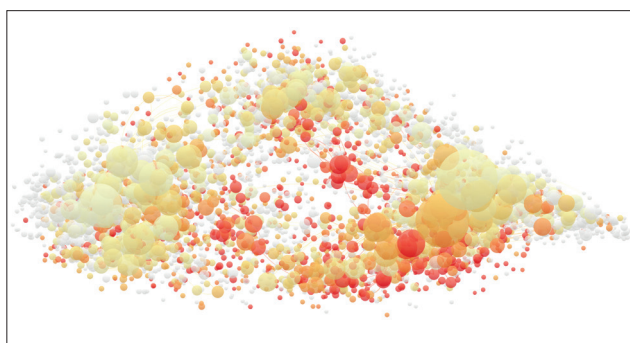
(e) PPG 33002010022P3 – BioSci III
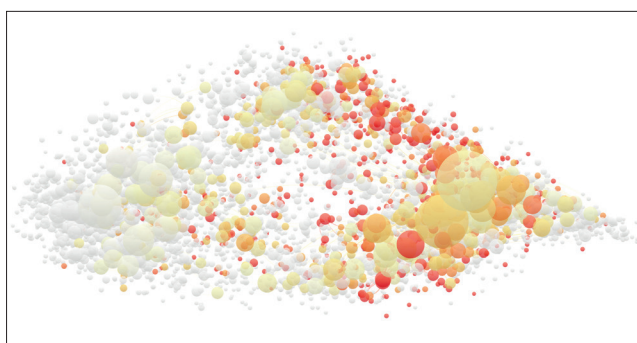
(f) PPG 33002029026P4 – BioSci III
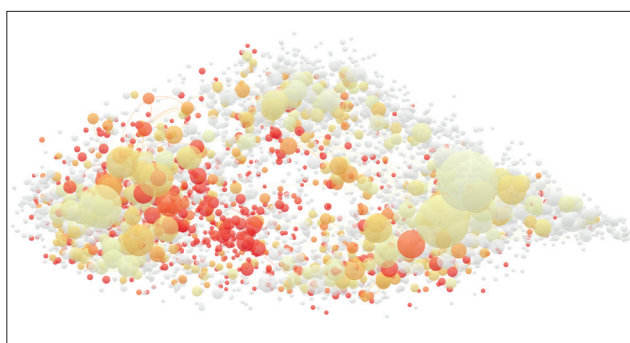
Figure 5. Term maps of papers from the BioSci evaluation areas, highlighting the publication profiles of individual PPG (2017-2018)
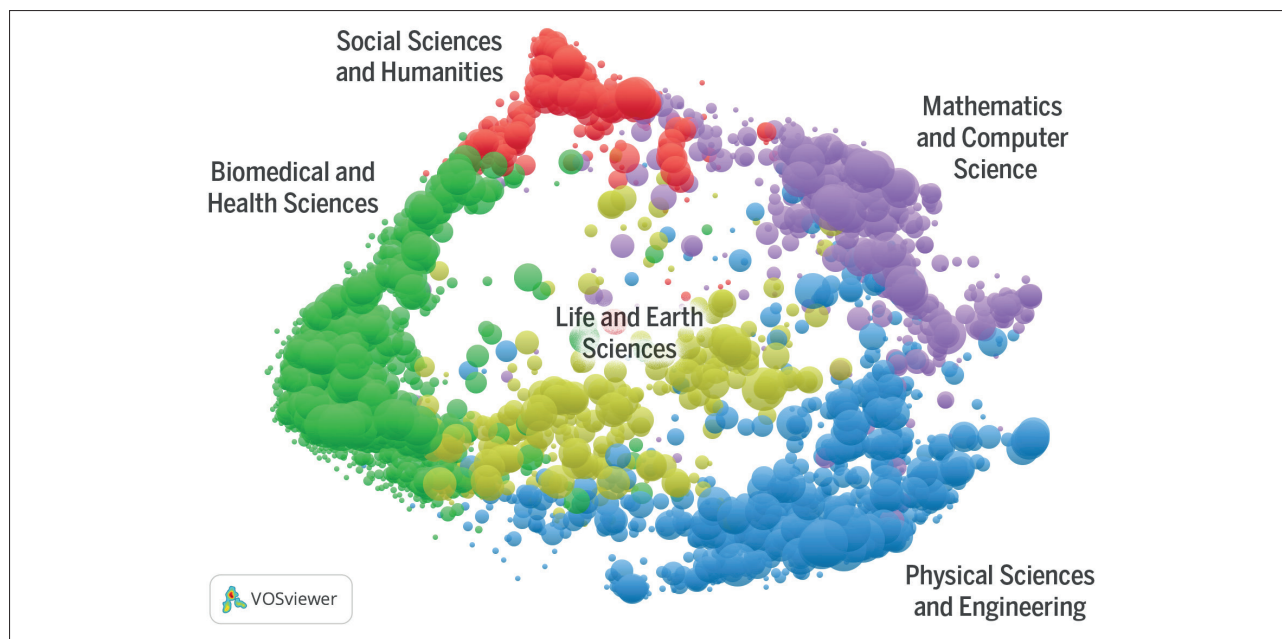
Figure 6. Map of scientific publications indexed by the *Web of Science* (2017-2018)

only be considered if it supports the work of disciplinary experts who have the required background to analyse the evidence and decide whether or not a migration would be recommended.

A complementary approach to help disciplinary committees in the further assessment of these publication profiles is the observation of how papers from selected areas are inserted into a broader map of science. To proceed with the analysis of the three areas of "Biological Sciences", the 2022 version of such a map was used as a starting point. The resulting visualisation seen in Figure 6 is built using the Leiden Algorithm, a method that performs cross-citation and semantic analyses of titles and abstracts between *WoS*-indexed publications since 2000 (**Traag**; **Waltman**; **Van-Eck**, 2019). The map in question displays a total of 4159 clusters, each of them composed of papers that have thematic relationships. Clusters are sized according to the total number of publications from 2017- 2018, and the distances between them reflect the proximity of research subjects and citation-relations.

Using Figure 6 as a canvas, it is possible to visualise publications from the three BioSci areas under analysis, recalculating the sizes of the respective clusters. The result, seen in Figure 7, shows the expected distribution of the papers mainly around clusters connected to the major fields of "Life and Earth Sciences" and "Biomedical and Health Sciences", which were highlighted in green and yellow on the previous map.
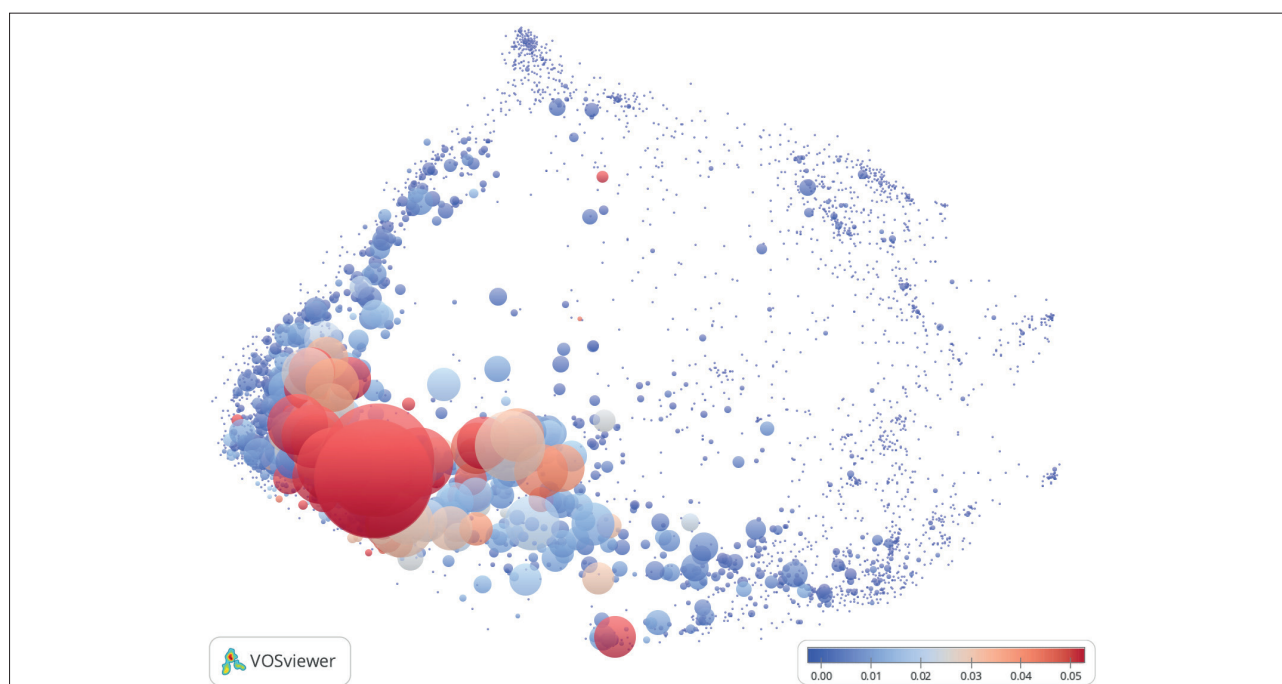
Figure 7. Map of *WoS*-indexed scientific publications from Brazilian graduate programs in the BioSci evaluation areas (2017-2018)

(a)   (b)   (c)
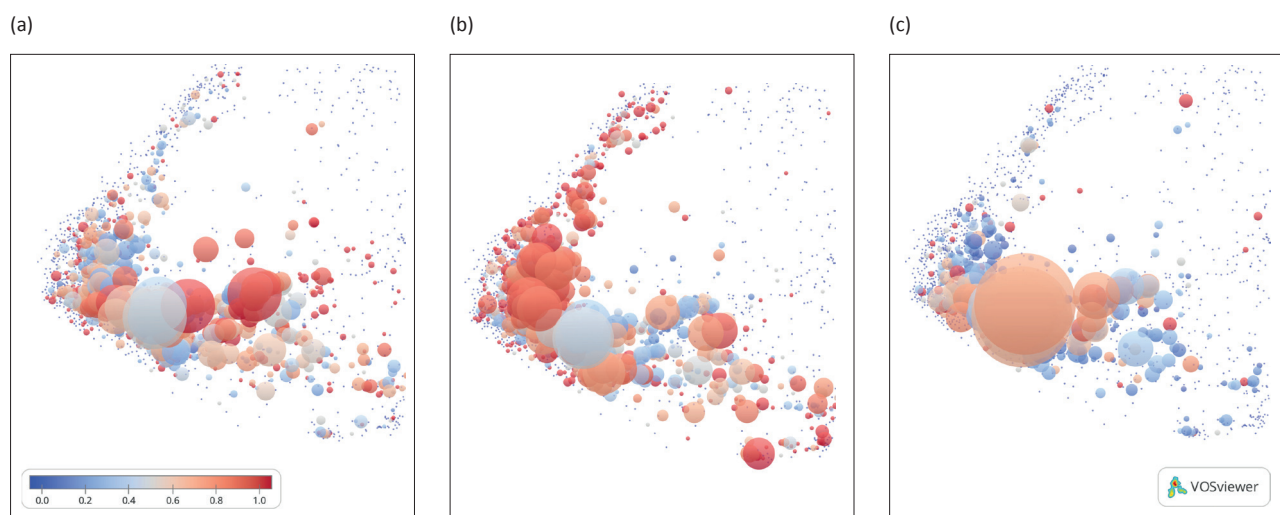
Figure 8. Map of scientific publications indexed in *WoS* from Brazilian graduate programs in: (a) BioSci I; (b) BioSci II; and (c) BioSci III (2017-2018)

Of the 4159 clusters on the displayed map of science, the BioSci graduate programs contribute to a total of 1580, 420 of those with more than 10 papers in the period. The colour overlay added to Figure 7 shows the percentage of those publications in relation to global production. Clusters displayed in vivid red are those in which the percentage of Brazilian papers is higher in relation to the total output. For instance, an analysis of the interactive version of the visualisation reveals that almost 20% of the world's publications in clusters related to tropical diseases such as Chagas and Leishmaniasis or in topics such as antivenom come from Brazil.

However, more than its contribution to global science, for the purpose of this study, the most relevant is understanding how Brazilian BioSci research is distributed in the three existing evaluation areas. For that, Figure 8 shows the previous map filtered for each of the BioSci areas. The visualisations are cropped to display the lower right of the original map, where most of the publications of those areas can be found.

Figure 8 seems to confirm the conclusions derived from Figure 4, for instance, with respect to BioSci II (b) operating in its own research topics, while some overlap can be observed between BioSci I (a) and III (c). Such an overlap can be seen with the help of a new colour overlay, which applies the scale to the percentage of publications in each BioSci area in relation to the total of the three areas. Therefore, the predominance of reddish tones in many of the BioSci II (b) clusters indicates that 80 to 100% of the papers included there come from the area. However, while there are clusters highlighted in (a) where a majority of the papers belong to BioSci I, that is not the case for (c) where even clusters particularly large record only around 60% of the papers.

To better understand what the map reveals, Table 2 looks into the top 10 clusters for each of the three areas (as there is some overlap, the three top 10 are seen in 20 clusters). The table identifies the clusters with their unique id at the database, and includes associated keywords to give some perspective of the topics included. For each of the three BioSci areas, the total number of papers (P) and their percentage in relation to the whole area is shown. The same is done for the combination of the three areas.

The first interesting observation from Table 2 is that the top 3 clusters represent more than 37% of the total number of publications in the combined areas. These are particularly relevant for BioSci III, as they concentrate more than half of the papers in the area, which are shown as the largest adjacent circles seen in Figure 8c. However, despite the high proportion of papers from the area in those clusters, the contributions from BioSci I and II are also significant. In fact, they reveal another interesting perspective: collaboration.

When the total number of papers of the BioSci combined is compared to those of the individual areas, they do not seem to add up. However, that happens because the same paper can be counted for more than one area, when a coauthorship led the publication to be reported in PPG from distinct areas. In the case of cluster 503, a total of 364 papers from all BioSci are mapped, 238 without crossarea collaborations (54, 57, 127 per area). Out of the 111 remaining papers from BioSci III, for instance, 42 were coauthored with BioSci I and 53 with BioSci II researchers, while 16 came from collaborations involving the three areas.

Evidently, the calculations used to build the maps of science and underlying clusters could consider fractional counting of publications to the proportion of the contribution of each area into account. However, the goal here is to map the research with which graduate programs are involved, making the full count approach appropriate, even because it helps identifying the crossarea collaborations.

> An analysis of the system's history has shown that the motivation behind its creation was a noble one: to guarantee that merit was a core element to the distribution of grants awarded by the chief funding agency in the country

Table 2. Top 10 clusters for each BioSci area, combined and sorted by total number of publications (2017-2018)

Id	Keywords	SciBio I		SciBio II		SciBio III		SciBio (all)	
		P	%	P	%	P	%	P	%
503	visceral leishmaniasis, psychodidae	127	10.0	141	11.1	238	18.7	364	13.0
521	chagas disease, reduviidae, hemiptera	175	13.8	172	13.6	197	15.5	353	12.6
53	zika virus, dengue, west nile virus, aedes	137	10.8	123	9.7	241	19.0	332	11.9
1190	phospholipase, snakebite, lipoprotein	88	6.9	72	5.7	67	5.3	150	5.4
1117	histoplasmosis, cryptococcal meningitis	62	4.9	42	3.3	112	8.8	144	5.1
7	microsatellite marker, genetic structure	127	10.0	2	0.2	5	0.4	132	4.7
1804	characiformes, teleostei, siluriformes	128	10.1	28	2.2	1	0.1	129	4.6
66	cerebral malaria, chloroquine, antibody	30	2.4	30	2.4	104	8.2	119	4.2
50	carvacrol, thymol, ocimum basilicum l	34	2.7	85	6.7	18	1.4	118	4.2
520	schistosomiasis, strongyloides stercorali	66	5.2	35	2.8	62	4.9	114	4.1
145	ixodidae, lyme disease, babesia	54	4.3	24	1.9	57	4.5	109	3.9
675	p2x, p2x7 receptor, extracellular atp	24	1.9	94	7.4	10	0.8	108	3.9
473	renin receptor, ace2, angiotensin ii	23	1.8	92	7.3	2	0.2	100	3.6
294	candida albican, candidemia	27	2.1	34	2.7	58	4.6	88	3.1
1707	galectin, tim, t cell immunoglobulin	56	4.4	59	4.7	26	2.0	84	3.0
272	urocortin, fever, cytokine, interleukin	17	1.3	69	5.4	9	0.7	80	2.9
82	morphine, ketamine, gabapentin, opioid	16	1.3	69	5.4	6	0.5	77	2.7
615	monogenea, acanthocephala, perciformes	14	1.1	14	1.1	54	4.2	73	2.6
45	tetrahydrobiopterin, arginase, nitroxyl	9	0.7	66	5.2	4	0.3	69	2.5
769	fabry disease, pompe disease	56	4.4	16	1.3	0	0.0	58	2.1

Regarding the graduate programs, it is also possible to visualise and list their individual publications to the map of science and respective clusters, identifying those which are more or less aligned with the respective area profiles. The method, similar to what was shown in Figure 5, would be even more powerful, as the visual alignment would be complemented by a detailed list of publications in each cluster, complete with journals, collaborations and other resources that would be valuable for expert committees rethinking the classification system of evaluation areas in Brazil.

5. Conclusions

This study investigated the Brazilian classification system for research and graduate education. An analysis of the system's history has shown that the motivation behind its creation was a noble one: to guarantee that merit was a core element to the distribution of grants awarded by the chief funding agency in the country. Through the implementation of peer review committees, an evaluation model anchored by expert analysis was established. This is a model that is still current in Brazil.

Over time, the original committees multiplied towards the current 49 evaluation areas, organised into nine broad areas and three upper groups. This evolution was guided by the evaluation dynamics at *CAPES*, in part to follow the advancement of science, but also as a strategy to better manage the immense growth of the *Brazilian National System of Graduate Education* (*SNPG*). Furthermore, since the resulting classification played a central role in a high stakes national evaluation, its use beyond *CAPES* by other agencies and also by every higher education institution engaged in research in Brazil was inevitable.

Considering its evolution process, the Brazilian classification system under analysis became somewhat peculiar, especially when compared to international classification systems such as the *OECD Fields of Research and Development* (*FORD*) and the *International Standard Classification of Education* (*ISCED*). In particular, the misalignment among the evaluation and broad areas of the Brazilian system and their corresponding levels in the alternatives analysed is significant, especially in the SSH profiles.

> Instead of aiming for a reduction in the number of areas, the suggestion is to value and go beyond the "cognitive" approach described by Glänzel and Schubert (2003), which considers the input of different types of experts.

One of the conclusions of this study is that the Brazilian classification system needs to be re-examined. Not only because of the misalignments identified, but because of other issues such as cryptical names of some evaluation areas, inadequacies in the allocation of graduate pro-

> " One of the conclusions of this study is that the Brazilian classification system needs to be re-examined "

grams, the combination of sub-areas with significant epistemical differences, and the existence of areas which evolved to become apparent duplicates of each other.

Furthermore, the proposal for revision is aligned with recommendations from the special committee that was in charge of monitoring the *Brazilian National Plan for Research and Graduate Education* (2011-2020), which also highlighted the need for change. However, the *PNPG Committee* (2020) suggested the change to be one of significant reduction in the number of evaluation areas, reversing decades of efforts to build a system where the growing number of areas allowed for the comparative evaluation to be performed among graduate programs that were closer to each other.

This study proposes a different path. Instead of aiming for a reduction in the number of areas, the suggestion is to value and go beyond the "cognitive" approach described by **Glänzel** and **Schubert** (2003), which considers the input of different types of experts. For that, it is recommended to adopt the complementary "scientometric" approach to provide expert committees with evidence to suport their analysis.

The scientometric methods explored in this paper demonstrate the potential of the approach, as the different analyses performed could be considered as starting points to help *CAPES* and the Brazilian academic community in the challenging task of promoting a sound and evolutionary review of the adopted classification system. With that, it is less important that the resulting classification decreases or increases the number of evaluation areas existing today. The important is that those new areas properly reflect the reality of the Brazilian science system and its international connections.

Notes

1. See **Brasil** (2020) for further discussion on the *National Plans for Graduate Education*.

2. This research translates the original Portuguese term "Ensino" as "Teaching & Learning" according to commonly used international terminology.

3. Interactive versions of all figures shown in this study will be made available at the time of publication, in a dedicated repository page:
http://andrebrasil.github.io/papers/classification

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Seeing impact: genres referencing journal articles

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Abstract

This paper examines the societal impact of research from the perspective of interconnected genres. Information reaches professionals outside academia through many different types of documents. Those documents often connect with scholarship by referencing academic work, mentioning professors, or publishing articles authored by scholars. Here the pattern of referencing journal articles is compared across professional genres. Such citation counts make visible societal impacts to the extent that a field engages a genre, and different genres favor different fields. Biomedical sciences are most visible in patent citation counts. News and social media most often reference medicine. Policy documents make heavy use of social science. *Ulrich*'s indexing of trade journals, magazines, and newspapers suggests social sciences engage heavily with the professions through trade press. However, caution is warranted when using citations to indicate societal impact. Engagement with scholarship occurs not only through referencing but also through authorship and mentions. Not all citations indicate substantive engagement, particularly in social media. Academic literature is but one of many types of sources referenced in professional genres. And scholarship engages with many genres beyond those currently indexed, most notably trade press. Nevertheless, understanding citation patterns across heterogeneous professional genres offeres a promising frontier for information sciences to provide a foundation for the analysis of scholarship's societal impact.

Keywords

Societal impact; Research impact; Academic literature; Journal articles; Referencing; Citations; Patents; Trade press; Magazines; *Twitter*; *Facebook*; Newspapers; Genres; Policies; *Overton*; *PlumX*; Citations; Citation patterns; Scholarly literature.

1. Introduction

Increasingly, researchers, universities, and funders are interested not just in the scholarly impact of research but also the broader societal impact. Bibliometricians have responded by analyzing how often research articles are cited in genres other than journal articles. *Mendeley* uploads and tweets linking to journal articles have been counted. References to journal articles have been counted in: blogs (**Bornmann**, 2015), newspapers (**Begum** *et al.*, 2016), regulatory impact analyses (**Desmarais**; **Hird**, 2014), policy documents (**Bornmann** *et al.*, 2016; **Pinheiro** *et al.*, 2021; **Szomszor**; **Adie**, 2022; **Vilkins**; **Grant**, 2017), clinical trials documents (**Thelwall**; **Kousha**, 2016), a drug information database (**Thelwall** *et al.* 2017) and clinical practice guidelines (**Grant** *et al.* 2000; **Kryl** *et al.* 2012; **Lewison**; **Sullivan**, 2008; **Thelwall**; **Maflahi**, 2016). Counts of references in these documents are used to signify broader societal interest in research output.

These analyses tend to examine one type of source, or genre, using one database and explore constructing indicators of broader impact using that source. The number of genres explored across these studies suggests a bigger picture awaits exploration. Shifting focus from the counts to the genres highlights the many different types of documents through which information reaches professionals outside academia. Those documents often engage with scholarship and record that engagement using references. This paper examines the pattern of referencing across genres as well as evidence of the complexity of genre intertextuality. That is, I examine the societal impact of research from the perspective of interconnected genres. Professional information genres are the frame of reference, and their interconnection with scholarship is the phenomenon of interest.

> " Increasingly, researchers, universities, and funders are interested not just in the scholarly impact of research but also the broader societal impact "

2. Background

Sources of information have proliferated over the past century, with ever more scientific journals being published, and ever more newspapers, magazines, and patents appearing. The advent of digitization about twenty years ago accelerated expansion. The internet challenged existing periodicals to adapt and build a digital presence. As well, new sources and new genres multiplied. In the dental trade press, print magazines were joined by digital forums, commercial news websites, news aggregators, and independent bloggers (**Hicks**; **Isett**; **Melkers**, 2019). *Facebook* and *Twitter* were established and became another way for professionals to share technical information with the added possibility of conversation and engagement with a broader audience. *Ulrich*'s indexes trade press journals and magazines, and Figure 1 displays the number of trade press journals, newspapers, and magazines established in each decade since the 1960s. The trade literature expanded every decade, with the strongest growth in the 2000s, more than double the growth rate in the 1970s and 2010s, suggesting digitization took off during those years.

The internet has revolutionized the accessibility of every genre. Of course, *Twitter* and *Facebook* were established as platforms to post content accessible to all. Subscription trade press and newspaper articles are now findable and often readable one at a time without paying. Ad-supported news sites, both trade press and mass media, are open to all. The patent database used to be accessible to specialists who acquired physical copies of the tapes containing the database. Now the patent database is online, searchable through *Google*, and readable by everyone. The *National Academies* removed the paywall from their reports in 2011, and now about half of report use traces to the general public, i.e. outside teaching and university research use (**Hicks** *et al.*, 2022). Governments and think tanks post their policy reports online for anyone to read for free. The *Overton* database of policy documents shows strong growth in the number of documents indexed over time likely because digitization has made policy documents much more accessible[2]. The expansion in numbers and genres of professional information sources and the reduction in barriers to accessing them has revolutionized the professional information system. It is now much more complex, accessible, and used than it was even 20 years ago.

Professional information genres are not self-contained. Referencing is primarily associated with journal articles; indeed, almost all scholarly journal articles contain references. Most links between documents are to other documents of the same genre. Thus, journal articles primarily reference other journal articles, and patents primarily reference other patents. Therefore, most analytical attention is devoted to characterizing the networks these links establish between documents. However, referencing is found throughout professional genres. Though not all items contain references, some do, and among those, some contain references to scholarly journal articles.

The proliferation of professional information genres in recent decades offers ever-expanding opportunities to analyze the links between documents, though analysis is challenging in the absence of comprehensive indexes. Of course, well-established, high-quality databases –*Scopus*, *Web of Science*, *Dimensions*, and *PubMed*– track the
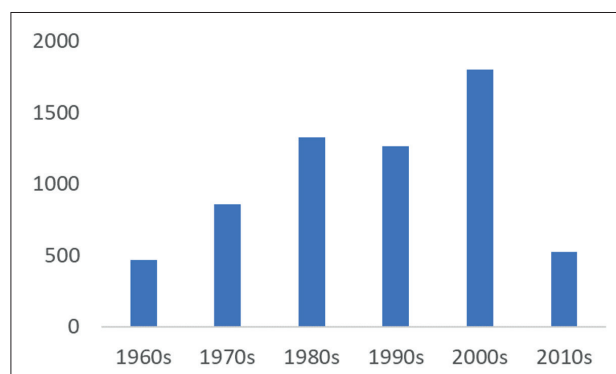

Figure 1. Number of US trade journals established in recent decades. Source: *Ulrich*'s web[1]

expanding scholarly literature. And patents have always been indexed, so our understanding of the societal impact of scholarship is heavily shaped by the analysis of patent referencing. The expanding digitization underpinning the proliferation of genres also enables indexing. Databases such as *Altmetrics*, *PlumX*, and *Overton* were founded to index references in social media and policy documents, and the picture they provide of research impact differs. The indexing of references to journal articles originating in other media opens up analytical opportunities to identify the research of most interest to different audiences. Taking advantage of these indexes, the professional information genres whose referencing is compared here include trade press, policy reports, news, blogs, *Twitter*, and patents.

3. Genres referencing journal articles

Many genres reference research, but genres' goals differ, and therefore they reference for different reasons. Genres also differ in their pattern of referencing across scientific fields, indicating that audience interests vary. In what follows, I characterize professional genres referencing scholarship and their pattern of referencing journal articles.

To represent each genre, I provide sample titles. The titles concern a single topic, a dental imaging technique called cone beam computed tomography (CBCT). In CBCT, an X-ray source rotates around the patient's head, obtaining hundreds of distinct images, which software compiles into a three-dimensional image. The first CBCT scan was taken in 1994, and the first dental CBCT paper appeared in 1998. In 2001 the *FDA* approved the first CBCT scanner for the US market. Use in US dentistry took off only in 2006-07 (**Schulze**, 2015), marked by the first sessions on CBCT at the *American Dental Association* national conference (**Hicks**; **Melkers**; **Isett**, 2019).

First, I set a baseline with the pattern of referencing in *Scopus* which is then contrasted with the pattern of referencing in news and social media, patents, policy documents, and trade press. Counts report citations to/mentions of papers published in 2018 or after. Cited fields are aggregated into five high-level categories: life sciences, including agriculture and molecular biology; health, including medicine and allied health professions; physical sciences, including chemistry, engineering, computer sciences, and environmental sciences; social sciences, including economics and psychology; and multidisciplinary journals.

4. Journal articles

Journal articles exist to communicate research results to the scholarly community and serve as the output of research projects. Although a blog could serve the same purpose, authors value the additional services journals provide which include peer review to certify that an article is worth reading, editorial oversight to certify for readers that these complex documents meet minimum standards of legibility, findability in indexes and search, registration or independently associating a discovery with an author and a time, and keeping the article available in perpetuity. Journals are, in addition, being asked to certify an expanding list of article characteristics on behalf of readers: that the authors actually performed the research, that text isn't plagiarized, that images are not manipulated, that research was conducted ethically, that the underlying data are available to interested readers, and so on.

Journals vary in their relationship to non-scholarly use of research. This is easily seen in a research area closely connected to professional practice, dentistry. Table 1 shows titles from four dental journals. The first two specialist journals serve dental researchers and are indexed in the *Web of Science*. In contrast, *General Dentistry* and *Journal of the American Dental Association* (*JADA*) also serve dentists in practice and are indexed in *PubMed* only. Titles in the two specialist journals exhibit precision and technical complexity in their language use, in this case anatomical vocabulary, concern with technique –sialography– and with measurement. Using CBCT to obtain measurements of variable jaw geometry and ascertain ranges in the population was a prominent topic in the academic CBCT literature. In contrast, *General Dentistry* and JADA use anatomical vocabulary that overlaps with general vocabulary –for example, "teeth" and address their readers' concern with care– diagnosis and treatment.

Table 1. Journal article sample CBCT titles

Journal	Sample article title
Journal of oral and maxillofacial surgery	CBCT and *SimPlant* materialize dental software versus direct measurement of the width and height of the posterior mandible: An anatomic study
Dentomaxillofacial radiology	CBCT sialography of Stafne bone cavity
General dentistry	CBCT for diagnosis and treatment planning of supernumerary teeth
JADA	CBCT and the ortho-surgical management of impacted teeth

The distribution of references in journal articles across scientific fields depends on both the number of papers in a field and how long reference lists are in a field. Figure 2 displays the distribution of scholarly papers and citations across fields, with the total number of papers and citations recorded in the lower right corner. The physical sciences have the largest presence in *Scopus*. Health and biomedical sciences together would be comparable to physical sciences.

Interpretation of the pies also depends on the structure of the classification system. The next level of the hierarchical field classification scheme contains 27 fields. If the pies displayed 27 fields, medicine, with 14% of *Scopus* citations,
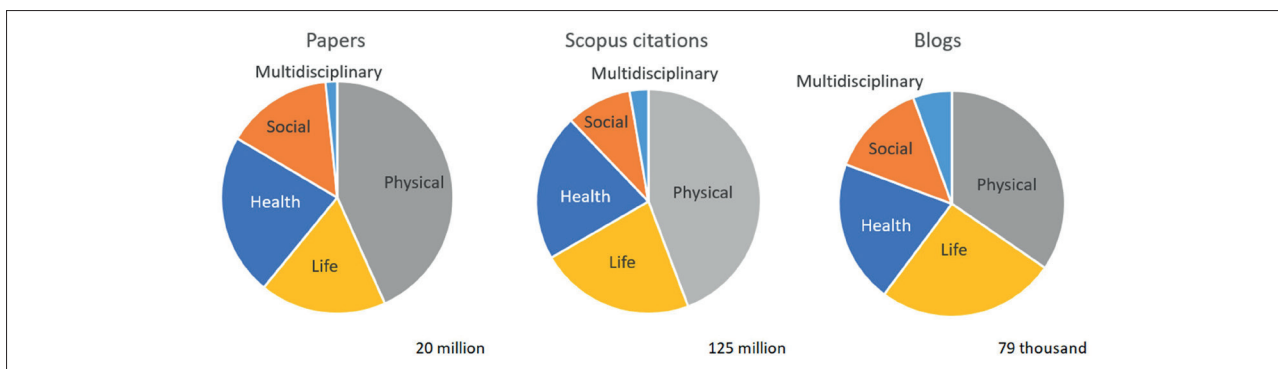
Figure 2. Academic pattern of referencing: the distribution of (1) papers indexed in *Scopus*, (2) the citations to those papers, and (3) the blog mentions referencing those papers across disciplines. Total counts of the entities are included. Note that the publications and citations/mentions may be applicable to multiple disciplines.

would account for the largest share, because at the 27 field level medicine accounts for 88% of the five fields comprising health sciences (the others are nursing, health professions, veterinary and dentistry). Oncology, infectious diseases, epidemiology, 49 subfields in total (more than double the number of any other field) are not split out at this level. In contrast, engineering, the largest component of physical sciences, accounts for only 18% of physical sciences because materials science, physics, chemistry, and computer science are split out at the 27 field level. The same is true of all the pies discussed below; that is if the pies displayed 27 fields, medicine would account for the largest share.

The pattern of referencing from blogs is also shown in Figure 2, as it is almost identical to the pattern in the scholarly literature, with physical sciences accounting for the largest share of citations from blogs, followed by life and health sciences. Medicine accounts for 13%. This might suggest that blogs referencing scholarly literature are primarily written by academics.

5. Public interest

Newspapers seek to entertain, educate and inform the public about current events. Items are news to the extent they have a big impact, involve conflict, happen nearby, involve well-known people, and deviate from everyday happenings. Current research advances sometimes meet these criteria, providing newsworthy items. For example, CBCT met these criteria once for *The New York Times*. The headline in Table 2 shows why; there was something to worry about. The article questioned the increasingly widespread use of CBCT, particularly in orthodontics for children, because of the higher radiation dose CBCT delivered compared to traditional dental x-rays (**Bogdanich**; **McGinty**, 2010).

Table 2. News and social media sample CBCT article titles

Genre	Publication	Sample article title
Newspaper	*The New York Times*	The radiation boom: radiation worries rise with 3-D dental images
Social media	*Twitter*	CBCT-based #root-canal length measurements are accurate and reliable when compared with a gold standard. [URL] #endodontic
		[URL] CBCT X-rays should not be done on every patient. At this point there is too much radiation. Impactions yes #majeroni

Advances in medicine are most often seen as newsworthy, garnering the most coverage, and accounting for over 34% of citations from news sources to journal articles (with 1% more coming from the other health sciences fields), Figure 3. Physical and life sciences each account for over 20% of news citations, with social and multidisciplinary each accounting
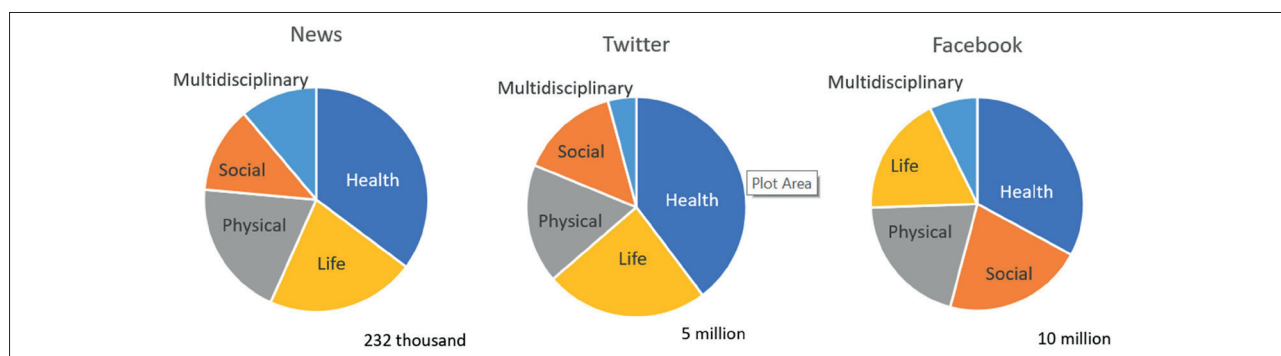
Figure 3. Public interest pattern of referencing: the distribution of (1) news mentions, (2) *Twitter* mentions, and (3) *Facebook* mentions to all *Scopus*-indexed papers across disciplines. Total counts of the mentions are included. Note that the publications and mentions may be applicable to multiple disciplines.
Source: *PlumX* data supplied by *Elsevier's ICSR Lab*.

for slightly more than 10%. Papers in multidisciplinary journals received outsize attention from newspapers as multidisciplinary journals such as *Nature, Science,* and *PNAS* publish and publicize the most dramatic scientific advances with the broadest implications. In addition, journalists often use academics as sources to provide context and depth to coverage of current events.

> " Physical, life and multidisciplinary sciences have a larger share of citations than of papers "

Facebook and *Twitter* exhibit different patterns of interest. *Twitter* is used to learn about fast-moving news, build awareness of information and build celebrity. In this environment, current research advances provide newsworthy and comment-worthy content. Of tweets referencing CBCT journal articles, 70% simply provided the paper's title and URL, which accurately reflects tweeting about dental journal articles in general (**Robinson-García** *et al.*, 2017). Table 2 lists other tweets that more usefully convey the conclusions of papers. Figure 3 shows that on *Facebook* and *Twitter* attention seems to be more evenly distributed across the four scientific areas, with health sciences garnering the most interest. Medicine accounts for 38% of references to journal articles on *Twitter* and 30% on *Facebook*. On *Twitter* life sciences, which is closely linked to health sciences, follow whereas on *Facebook* social sciences, which include psychology, is the second most referenced scientific area.

6. Research use in industry: patents

The classic measure of the use of research is referencing from patents. Patents protect inventions by awarding property rights to inventors. In return, they reveal knowledge of how an invention works. The patent office mandates that patent titles are short, accurate descriptions of the invention useful for indexing, classifying, and searching. Patent examiners will remove certain words, including "new", "improved", and "novel":
https://www.uspto.gov/web/offices/pac/mpep/s606.html

Although inventors may not wish to reveal their technical advance in the widely viewed title, patent titles are specific, technical, and convey the purpose of the invention, Table 3.

Table 3. Patent and policy document titles

Genre	Title
Patent	Methods and apparatus for super resolution scanning for CBCT system and cone-beam image reconstruction
	Method for teeth segmentation and alignment detection in CBCT volume
Policy Report	Cone beam CT for dental and maxillofacial radiology: evidence-based guidelines. (*Directorate-General for Energy*, *European Commission*)
	The use of cone beam CT in dental, oral, and maxillofacial surgery, and otolaryngology settings (*Canadian Agency for Drugs and Technologies in Health*)
	Compliance guide for dental radiology including dental cone beam CT (*New Zealand Ministry of Health*)

References in patents identify prior art, serving to establish the required novelty of the invention given prior art. Patent citations are taken to represent use of research in innovation. *USPTO* patents exhibit the highest rates of referencing to journal articles, and the first pie in Figure 4 reports referencing to journal articles in *USPTO* patents issued 2018-2020. The pattern of referencing from patents to scholarly literature is similar to that of referencing between journal articles in *Scopus* with physical sciences accounting for the greatest share, followed by life and then health sciences. The presence of social science is much reduced in patents compared to the journal literature. Thus life and health sciences are more visible, accounting for more than half of patent citations.
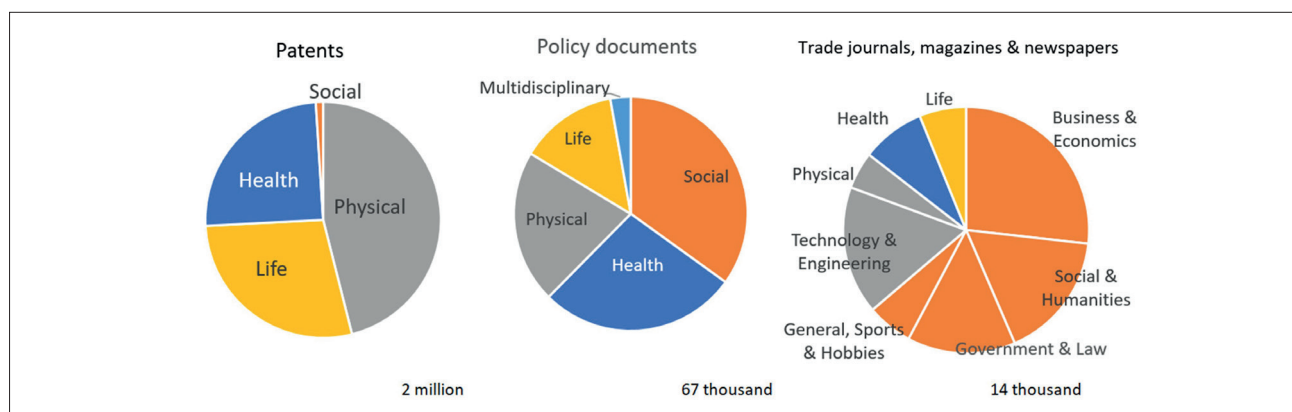
Figure 4. Use patterns. Patents, policy documents, & trade journals.
Source: *NSF Science and Engineering Indicators* 2022. Table SINV-82; Policy document citations to *Scopus*-indexed papers. *PlumX* data supplied by *Elsevier's ICSR Lab*; Ulrichsweb.

7. Research use in policy documents

Policy documents are written primarily for or by policy-makers and are intended to influence legislation, regulation, or other policymaking.

https://help.overton.io/article/whats-your-definition-of-a-policy-document

Policy documents are a heterogeneous genre system containing, for example: blog posts, forms, infographics, legislation, meeting agendas, meeting minutes, memos, policy briefs, posters, press releases, slide decks, speeches, and testimony. Policy reports help prepare policy-makers for legislating or regulating by teaching them about an issue and possible approaches to governing it. They help shape agendas and narratives around issues of concern.

Policy reports aim to cover technical topics for non-specialist audiences comprehensively. Therefore, their contents cannot be summarized in a title, and report titles are reduced to conveying topic areas. Table 3 shows three CBCT-related policy report titles. The titles are generic, establishing the association with CBCT and a concern with regulation but little else. In fact, readers may

> Advances in medicine are most often seen as newsworthy, garnering the most coverage, and accounting for over 28% of citations from news sources to journal articles

need to know the source of the document to motivate reading, so Table 3 also lists the authoring agency. The EU doesn't regulate dentists, so it aims to provide guidelines consistent with minimizing radiation exposure and a guide to future research, which the EU funds. The Canadian report establishes background knowledge to inform the regulation of manufacturers. The New Zealand document advises clinicians and manufacturers on meeting the requirements of radiation protection legislation.

Policy reports are written by university-trained writers. Presumably, universities trained writers in referencing, suggesting referencing in reports serves the classic purposes of avoiding plagiarism, providing resources to readers, and enhancing the text's credibility. The second pie in Figure 4 suggests that policy-makers' attention is directed very differently than the public's. Policy documents, likely mostly reports, most heavily reference social science literature, which includes economics and accounts for 37% of references. Health and physical sciences follow with 24% each. Life sciences attract less interest from policy documents than from any other genre.

8. Research use in trade journals, news & blogs

The professional press provides news relevant to the practice of a profession and, at least in medical fields, continuing education opportunities. The distinction between journals and trade magazines is not always clear cut. Two of the trade magazines in Table 3, *Compendium* and *Dentistry Today*, are partially indexed in *PubMed*. Professional magazines contain articles analogous to those in peer-reviewed journals as well as articles on topical subjects, news items, reviews, and surveys. Magazines and news sites are supported by advertisements targeted to those in the field. Unique to professional media is the product announcement. New or improved materials and equipment are introduced continuously and announced in press releases. Professional media undertake to inform their readership of these developments. Professional channels also seek to inform readers of upcoming conferences and report on highlights of recent conferences for those who could not attend.

Table 4. Professional magazine, news, and blog sample CBCT titles

Genre	Publication	Sample article title
Magazine	*Compendium*	CBCT in endodontics: are we there yet?
	Inside dentistry	CBCT: A clinician's perspective
	Dentistry today	Utilizing digital imaging to enhance the team approach to implant treatment
News website	*Dr Bicuspid*	Conebeam and multislice CT measurements found equally accurate
		CBCT findings raise liability questions
Blog	*Endo blog*	Uses of CBCT in endodontics CBCT in endodontics to treat difficult anatomy, preserve teeth
	Dentaltown	Cone beam imaging is great, but what am i looking at?
	Flucke blog	Thanks to everyone who attended my ultradent 3D course yesterday
		We've installed the *Gendex CB500*

Table 4 shows that in contrast to journal articles, patents, and policy reports, articles in professional media have a more informal style and cover less technical sides of practice. In comparison with the general dentistry journals, the magazine article titles in Table 4 deepen the concern with practice, explicitly taking the perspective of one who is a team manager as well as a clinician and asking if the innovation is ready for application. Magazine titles offer enticements to read –promising to answer a question or sharing the reader's perspective.

> Information in professional media may be as accurate as peer-reviewed literature where it overlaps

Professional news sources aim to deliver practical, trust-worthy, and relevant material to professionals to help them improve their practice and profitability. They rely on experts, cover widely discussed issues about which there is disagreement, as well as professionally relevant new social and technological trends. In contrast to magazine article titles, the news titles provide the takeaway up front with the article furnishing details for those interested in learning more. The sample titles from professional news source *Dr. Bicuspid* report findings in the journal literature on measurement accuracy and discuss liability, a business issue.

> Policy documents, likely mostly reports, most heavily reference social science literature, which includes economics and accounts for 37% of references. Health and physical sciences follow with 24% each. Life sciences attract less interest from policy documents than from any other genre

Most professional blogs do not reference research. The blogs in Table 4 vary in their approach with the first being more professional, almost magazine-like, and the others being extremely informal and chatty. Blog titles reveal an even stronger practitioner focus, firmly grounded in the dentist's point of view.

Professionally oriented blogs, news sites, and magazines differ in publishing models and content. Publications source articles differently, value different types of information and vary in their presentation. Important values such as technical sophistication, the credibility of peer review, grounding in the realities of clinical practice, and being attuned to shifting pressures in dental care are accommodated to differing degrees in different channels. Each channel disseminates information to practicing dentists about advances in knowledge and information about the profession and management of a practice. Although their reliability is not held in high regard, empirical analysis suggests that information in professional media may be as accurate as peer-reviewed literature where it overlaps (**Hicks** *et al.* 2019).

The third pie in Figure 4 reports the distribution of trade journals, magazines, and newspapers published in the United States as indexed in *Ulrich*'s. In contrast to the other pies, social sciences account for 64% of trade journals, with business & economics alone accounting for 27%. The references in peer-reviewed articles in trade journals indicate that the author may have read the journal article, and it shaped their thinking, i.e. knowledge flow. References in the trade press are not indexed, but the author's analysis of trade press indexed in *Scopus* suggested that the distribution across fields of references from the trade press mirrors the distribution of titles across fields. That is, business and economics trade journals likely cite mostly business and economics journal articles. *Scopus* does index some trade press content, though the distribution differs with half of *Scopus*-indexed trade journals and magazines in engineering. 28% of trade press articles indexed in *Scopus* contain references, with articles averaging 15.6 references, half of which are indexed in *Scopus* (*Elsevier ICSR*, 2022).

9. Whose impact do we see?

Journal articles, patents, trade press, policy reports, newspapers, and social media provide information for different purposes and more or less often use references to journal articles to support those goals. From a researcher's perspective, citations from other genres suggest their work is helpful to people outside academia, hinting at societal impact. Therefore counting citations from other genres has attracted increasing attention in recent years, and developing databases to make such counts possible has become a viable business proposition.

Such citation counts make visible societal impacts to the extent that a field impacts a genre. Different fields are relevant to different parts of society. For example, while some industries may rely heavily on trade secrecy, chemistry and pharmaceuticals are very well served by the patent system, and advances in these technologies are quite closely related to advances in research. Therefore, biomedical sciences are most visible in patent citation counts. Patent-to-paper citation counts have been available for several decades, having first been analyzed in 1997 (**Narin** *et al.*, 1997). When only patent citation counts were available, only biomedical sciences and, to a lesser extent, physical sciences seemed to be applicable outside academia. In 2011 *Plum Analytics* and *Altmetrics*.com were founded, making it possible to count citations from news and social media sources. These sources quantitatively confirm the intuitively obvious public interest in medical advances. Only in 2019, with the founding of *Overton.io*, did it become possible to see the heavy use of social science outside academia in a comprehensive, analytical fashion. An unindexed pool of references remains in the trade press. *Ulrich*'s indexing of trade journals, magazines, and newspapers suggests even more engagement occurs here between social sciences and society, specifically with professionals, and would be visible in referencing patterns.

The visibility accompanying citation counts helps researchers and universities being evaluated on their societal impact. But beyond that, such visibility supports arguments that the money government spends on a field helps society. It is important to remember that field visibility varies across genres and that we have blind spots corresponding to unindexed genres. Even beyond that, there are societal engagements that do not register in documents of any type. Such impact can only be seen comprehensively in collections of case study narratives like those provided by the UK REF exercise. Citation indexes make citation counts possible across many more genres, but those numbers do not account for everything.
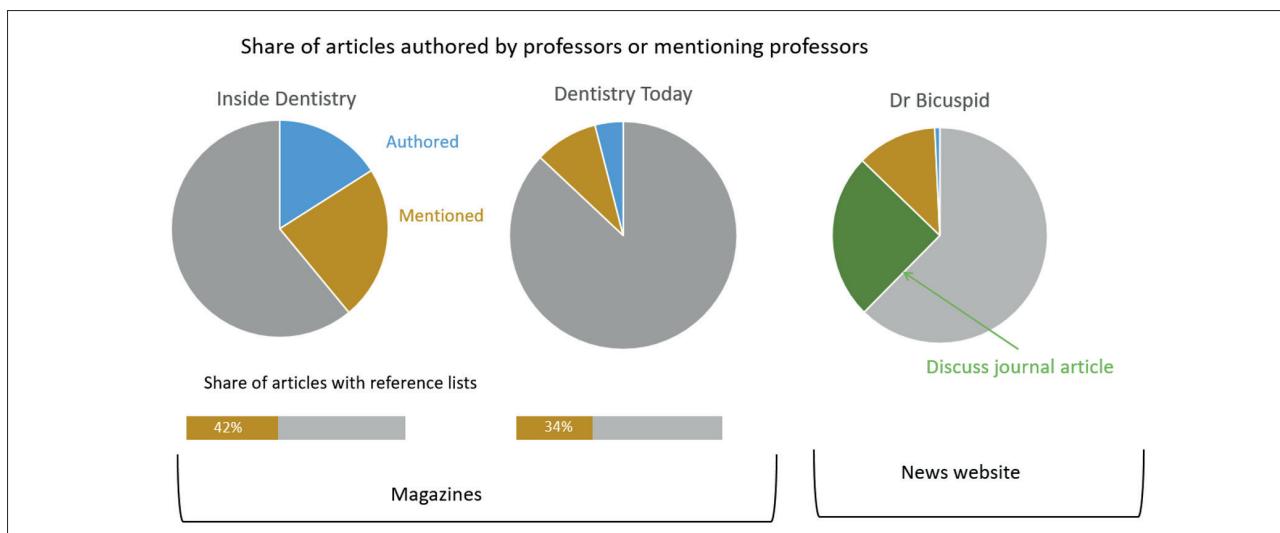
Figure 5. Appearances by academics in professional media vary with editorial policies

10. Caveat: Interaction is more than just referencing

Genres interact not only through referencing but also through authorship and mentions. Academics are listed as inventors on some patents. They host blogs, tweet, and post professional information on *Facebook*. Academics also author policy reports and white papers. Particularly in the social sciences, enlightenment literature can be considered one of the four kinds of literature through which knowledge is advanced and disseminated (**Hicks**, 2004). Enlightenment literature is a term used to denote periodicals dedicated to knowledge transfer to non-specialists, i.e. non-scholarly literature. Social science builds on enlightenment literature; 67% of references in social science articles are to literature outside *Scopus* (*Elsevier*, 2019, Figure 4). Studies have found that one-quarter of publications of social science university departments were in the enlightenment literature, or periodicals not indexed in the *Social Sciences Citation Index* (**Hicks**, 2004). Therefore, academics will author articles in *The New York Times* (**Hicks**; **Wang**, 2013) and in the trade press. In dentistry, several prominent authors with more than 100 papers indexed in *Medline* authored articles in dental magazines and on news sites. Professors who also write for the professional literature can serve a valuable role in diffusing state-of-the-art knowledge into practice (**Hicks**; **Melkers**; **Isett**, 2019).

Newspapers and trade press quote professors to provide context and depth to coverage of current events. In addition, professors' work is occasionally newsworthy enough to merit an article discussing a just published peer-reviewed journal article. *The New York Times* mentioned academics in 24% of articles in 2011 (mentioning university, professor or study, **Hicks** & **Wang**, 2013). Similarly, *Inside Dentistry* quoted professors in one-quarter of its articles. Combined with the 16% of articles authored by professors, almost 40% of articles involved academics. The news website *Dr. Bicuspid* quoted professors in 16% of articles (**Hicks**; **Melkers**; **Isett**, 2019). Figure 5 illustrates the extent of multiplex interaction with scholarship across professional dental literature, involving not just referencing but also authorship and quotation/mentions, and suggests that differing editorial policies influence interaction.

11. Caveat: Citations should be weighted

If we interpret appearance in another genre as use of research, it behooves us to consider how much the encounter in another literature engages a reader with the research. Perhaps the most substantial engagement is offered by articles about a research advance. Newspapers such as *The New York Times* or *The Economist* will write articles explaining recent discoveries of broader interest. As Figure 5 shows, professional news sites will also write articles about recent advances reported in the scholarly literature. In this way, broader audiences learn a great deal about a recent advance. Scholars who author articles in enlightenment or professional literature convey knowledge informed by their research to wider audiences. If use of research includes advancing public understanding of the world we live in, then such broader coverage achieves use.

Referencing also implies a substantive knowledge flow, if not between the scholarship and the broader audience, then between the author of the enlightenment or professional article and the scholarship. Similarly, references from patents to papers establish substantive use. Patent references legally delineate prior art, meaning that the invention offers a nov-

el advance beyond what was reported in the referenced paper. Such references are taken to indicate knowledge flow between the researcher and the inventor. References in enlightenment and professional literature might suggest that the article's author read and used knowledge learned from the referenced paper; therefore, such references could indicate knowledge flow.

> Counting citations from other genres has attracted increasing attention in recent years, and developing databases to make such counts possible has become a viable business proposition

Mentions of professors in news or professional articles seem to be a weaker link. The article's author presumably contacted the professor to provide context and background to the issue discussed. This seems less like knowledge flow than an acknowledgment of the professor's credibility as a pundit in the topic area. Similarly, close reading of tweets in dentistry suggested only a small percentage involved substantive engagement with the paper by the tweeter or offered the reader substantive information about the paper beyond metadata such as title or URL. Advocates claimed that tweets were conversational, reflecting discussion beyond disciplinary boundaries (**Priem**; **Costello**, 2010). However, a conversation would require a human behaving like a human on both sides of the transaction. Many dental tweets turned out to be less than human in being generated by easily automated processes such as hitting the retweet button to send a paper title and URL. Hitting a button to generate a tweet of metadata is hardly conversational. And the high-frequency activity so generated leads to information overload on the side of readers, prompting withdrawal instead of engagement, again not a conversational behavior (**Robinson-García** *et al.*, 2017). Mentions and tweets, though countable, convey less and therefore probably should carry lower weight than other indicators of more substantial use and interaction between scholarship and broader audiences.

> Social science builds on enlightenment literature; 67% of references in social science articles are to literature outside *Scopus*

12. Caveat: Many sources of information are used

Analysis of references to journal articles risks creating a blind spot because journal articles are not the only information source referenced in most genres and may not even be the most common source of information. Patents, for example, reference many more patents than journal articles. Policy reports reference a broad range of material. Drawing on a study of US state-level policy development in autonomous vehicles, Figure 6 reports the distribution of references in US state reports about autonomous vehicles.

Although many policy documents are short and unreferenced, most reports contain references. Here, reports are defined as sophisticated documents containing evidence and analysis to influence or lay the groundwork for decision-making, extending to at least ten pages, and written by or for policy-makers. Of 76 state reports found through internet searching, 56

Figure 6. Types of material referenced in policy reports

contained references, and the 2,635 references of 54 of these are displayed in Figure 6[3]. Reports produced by federal and state transportation agencies are the most commonly referenced source of information in state reports. Government reports accounted for 28% of references, while academic sources –journal articles, conference papers, and books– accounted for 18%. Media, at 15% of references, was almost as heavily used as academic literature. Reports produced by nonprofits (11%), university transportation research centers (7%), and consultants (7%) together accounted for one-quarter of the information sources. The *National Academies of Sciences, Engineering and Medicine* (*NASEM*) is prominent in the transportation information space because it houses the *Transportation Research Board*, which runs the *National Cooperative Highway Research Program*, an annual conference, and a journal (*Transportation research record*). Together these accounted for 6% of the citations in state AV (autonomous vehicles) reports. Corporate information, such as websites of car companies or *Waymo* gathered 5% of citations from state AV reports.

Figure 6 establishes that academic literature is one of many different sources informing writers of policy reports. Media proves especially useful to policy-makers attuned to current events. Consulting companies are often employed to write policy reports, which are then cited in later reports. Most policy areas are also a focus for research centers, both nonprofit and based in universities. They also seek to contribute to the conversation by writing reports, which in turn serve as sources for authors of subsequent reports. Policy-makers are understandably attuned to what other governments and agencies are thinking and so most heavily reference other policy-makers' reports. Among these many players, academic research has a place, though by no means the dominant position in informing policy deliberations as exhibited in reports produced by and for US state governments considering how to govern autonomous vehicles on their roads.

13. Caveat: Scholarship engages many genres

Journal articles build on information beyond the journal literature. One out of four references indexed in *Scopus* is to material outside *Scopus*, which can be taken to be references to genres other than scholarly journals. Referencing to non-scholarly material, ranges from about 20% in biochemistry, molecular biology, immunology, microbiology and neurology to 67% in social sciences and 80% in arts and humanities (*Elsevier*, 2019, Figure 4).

> Tracking the interactions between genres can provide a window into the use of knowledge throughout society

Newspapers are one genre not indexed in *Scopus* but sometimes referenced by journal articles. Among newspapers, *The New York Times* (*TNYT*) is by far the most commonly referenced. Close examination of references to *TNYT* revealed that use of *TNYT* in journal articles was growing over time and had several motivations. *TNYT* is referenced by papers studying *TNYT* or New York City; or when a topic's importance is established with reference to public interest, as evidenced by press coverage. Roughly half the time, a reference to *TNYT* brings into a journal article a quote from a famous person or information about an event, either very recent or historical. Sometimes references to t*TNYT* are indistinguishable from references to journal articles, the most famous case being an article reporting how two journalists broke the anonymization of an *AOL* data file. Academics sometimes publish in *TNYT* or its magazine, Paul Krugman being the most prominent example, and journal articles will reference these pieces (**Hicks**; **Wang**, 2013).

> Citation counts create visibility for societal impact of research. This visibility can help to support arguments for research funding because it visualizes the connection between research and societal benefit

Another blind spot created by counting references in indexed genres, especially single genres, is that publicly engaged research works across many genres, and the genres differ with the type of societal impact. The UK REF exercise provided an opportunity to see this. This national university research evaluation required departments to submit narratives describing cases in which research had a societal impact. References must corroborate not just that the research was published but also the statements describing the societal impact. This was relatively easy in, for example, inorganic chemistry, where references supporting impact were to patents, corporate websites, and letters from company managers testifying to their use of the technology.

The field facing perhaps the most difficult challenge in establishing societal impact was philosophy. Examining the publicly available REF cases in philosophy revealed that philosophers do have a variety of ways to engage the public including: public dissemination, issuing provocations, exploring the philosophy of everyday items such as wine or information technology, or engaging with people such as prisoners, teachers, the court system, or doctors and helping them address their problems (**Hicks**; **Holbrook**, 2020). Examining the references supporting the impact statements in these cases reveals that each case touched multiple genres, and the genres involved were highly heterogeneous. They included: blogs, podcasts, radio and television shows, advertisements, newspapers, trade press, exhibits, movies, policy reports, white papers, policy organization meeting agendas and minutes, and nonprofit, government, event, and video websites. Perhaps the only certainty is that if there is a genre of cultural expression, academics have engaged with it. Undue focus on counts of tweets risks under-appreciating scholarship's full cultural impact.

14. Conclusion

Tracking the interactions between genres can provide a window into the use of knowledge throughout society. Such analysis has become more available with digitization, but beyond that, high-quality indexing is required to facilitate analysis. Resources such as *Altmetric*, *PlumX*, and *Overton* are central to allowing analysis to extend beyond the scholarly literature indexed in *WoS* and *Scopus* or patents, indexed in patent office databases. This frontier in bibliometric analysis of societal impact offers many avenues to explore. What role do other genres play, and how does drawing on research support that? Do authors references for the classic reasons of avoiding plagiarism, providing resources to readers, or enhancing the credibility of a text? Or are there additional purposes served by referencing in non-academic settings? Can we comprehensively track references, mentions & authorship?

Citation counts create visibility for societal impact of research. This visibility can help to support arguments for research funding because it visualizes the connection between research and societal benefit. However, some fields benefit more than others, not perhaps because their societal impact is greater, but because more of their connections result in indexed citations. Therefore, there are blind spots corresponding to unindexed genres and to unreferenced connections. Only expensive exercises such as constructing comprehensive sets of narratives or building further citation indexes can overcome the blind spots. In the meantime, analysts of societal impact should remain aware that there exists rich and complex cultural engagement that they are unable to see.

> Newspapers are one genre not indexed in *Scopus* but sometimes referenced by journal articles. Among newspapers, *The New York Times* (*TNYT*) is by far the most commonly referenced

15. Notes

1. Search for: Status:("Active"), Serial Type:("Journal" "Magazine" "Newspaper"), Content Type:("Trade"), Language of Text:("English"), Format:("Print" "Online"), Country of Publication:("United States").

2. Therefore, it is impossible to discern the contribution to perceived growth originating in the number of reports produced versus the increased posting of reports on the internet (**Szomszor**; **Adie**, 2022).

3. Two of these reports were very unusual in their referencing pattern, having three times the number of references of any other report and skewing highly academic. They were excluded from figure 6.

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