

Repositório ISCTE-IUL

Deposited in *Repositório ISCTE-IUL*:

2025-02-12

Deposited version:

Publisher Version

Peer-review status of attached file:

Peer-reviewed

Citation for published item:

Costa, B. F. & Mateus, B. C. (2024). Innovating in journalism with newsgames: An exploratory study in Portugal. In Ljubiša Boji, Simona Žiki, Jörg Matthes, Damian Trilling (Ed.), Navigating the digital age: An in-depth exploration into the intersection of modern technologies and societal transformation. (pp. 43-82). Belgrade: Institute for Philosophy and Social Theory.

Further information on publisher's website:

[10.5281/zenodo.14203373](https://doi.org/10.5281/zenodo.14203373)

Publisher's copyright statement:

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Innovating in Journalism with Newsgames: An Exploratory Study in Portugal

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Introduction

The Fourth Industrial Revolution, also referred to as digital transformation, is presented as a paradigm in which cutting—edge technologies are utilized in automation and data exchange to enhance the quality, efficiency, and productivity of companies' production processes (Gilchrist 2016; Skilton, Hovsepian, 2018). Early on, the automotive, technology, and biologics industries took the lead in this transformation (Coelho, 2016).

In the creative industries, particularly media, innovation emerged in the United Kingdom at the end of the 20th century, encompassing

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sectors that combine creativity and communication technologies. The aim was to create economic and social value for companies (Granado, Silva, Vicente, 2020). By the beginning of the 21st century, innovation became closely associated with the rise of the Internet (Bonixe, 2020: 153–169).

Blogs and social media platforms were two forms of online communication initially adopted by individual users seeking to share opinions, thoughts, and ideas, as well as connect with friends and others. They were quickly integrated into news organizations, driven by user feedback and participation, leading to the development of new multimedia features and functionalities (Dogruel, 2014: 52–69).

Although traditional news companies have been compelled to migrate to digital platforms at the risk of compromising their revenues, Bonixe (2020) notes that this does not necessarily imply that the innovation processes in the media began solely with this transition. He provides management and production process innovation as examples.

Innovation in the media industry varies significantly across countries and companies and is influenced by financial factors, organizational culture, and government regulation (de-Lima-Santos, Ceron 2021; Meier et al., 2022; Pérez-Seijo, Vicente, 2022).

From 2010 to 2020, Meier studied and compared five European countries—namely Germany, Austria, Spain, Italy, and Switzerland—and identified the most relevant journalistic innovations, which include the use of social media and networks, the creation of new multimedia formats, the implementation of data analysis tools, and the adoption of digital business models (Meier et al., 2022).

In the area of artificial intelligence, it has been employed to automate repetitive tasks, such as report writing, and to personalize content relevant to news websites. These actions are supported by large data sets that reflect users' interests and behaviors in the digital environment (de-Lima-Santos, Ceron, 2021).

Data analysis to identify trends and patterns, automatic fact-checking, and the creation of automatic captions and transcripts for videos are underutilized in the news industry (*ibid.*), except in countries such as the U.S. and China.

In Portugal, the adaptation of the business model of news companies occurs slowly and involves few forms of innovation (Cardoso et al., 2019; Crespo et al., 2018). Newsgame projects are a journalistic innovation defined in the literature as the creation of games based on real events, intended to convey complex news information in a more attractive and engaging way to increasingly fragmented audiences across platforms (Bogost, Ferrari, Schweizer, 2012). Thus, this study aims to contribute to the production of scientific knowledge on a subject that is little studied in Portugal by identifying the challenges of creating newsgame projects and exploring professionals' perceptions regarding the integration of innovation in the media industry.

Industry 4.0 and News Media

Industry 4.0 encompasses more than the digitization of equipment, procedures, data collection, and IoT networking. Digital transforma-

tion is built on interconnectivity, transparency of information, decentralized decision-making, and technical assistance (Hermann, Pentek, Otto, 2016), all of which require companies to embrace speed, comprehensiveness, and depth of change (Schwab, 2017). This perspective complements the vision introduced by Takeuchi and Nonaka (2008/2004), who argue that sustainable companies are those that create knowledge, disseminate it throughout the organization, and rapidly incorporate it into new technologies and products.

Technological evolution has made scalable cloud and service solutions available, such as Software-as-a-Service (SaaS), Platform-as-a-Service (PaaS), and Hybrid Cloud. The combination of these solutions with cyber-physical systems, algorithms (which integrate implicit business logic), and cybersecurity mechanisms in a mixed infrastructure allocated in public and private data centers enables the development of integrated information management solutions. In turn, artificial intelligence empowers these infrastructures with the ability to learn and produce accurate, complex, and sophisticated predictions that support decision-making and the definition of new business directions (Iansiti, Lakhani 2020; Skilton, Hovsepian, 2018).

The false belief that Industry 4.0 is synonymous with complex, expensive tools only accessible to multinational companies has prevented many organizations from investing in the digitization of key operations within their value chains and research and development (RandD) capabilities for value-added products and services to address market challenges and opportunities (Gilchrist, 2016).

Media, together with performing arts, visual arts, music, film and video, design, advertising, and leisure software, constitute the so-called creative industries (Granado, Silva, Vicente, 2020). The diversification

of journalistic products, new business models, and the competition for space with digital platforms are inseparable dimensions of the investment made by the news industry in emerging technologies.

These initiatives can be analyzed under the 4Ps model introduced by Francis and Bessant (2005), which segments innovation into: 1) the ability to introduce or improve products; 2) the ability to introduce or improve processes; 3) the ability to define or redefine the positioning of the company or its products; 4) the ability to define or redefine the dominant paradigm within the company (Francis, Bessant, 2005).

According to Dogruel, innovation in media has eight characteristics, in terms of products and processes, that distinguish it from other industries: 1) its multidimensional nature involves technological, economic, social, and cultural dimensions and elements; 2) there is a high level of uncertainty and unpredictability; 3) as innovations are targeted at users, they seek to align with user feedback and participation; 4) they have a significant impact on society and culture in terms of social norms, values, and behaviors; 5) complex interactions occur between various actors and stakeholders; 6) they require new forms of collaboration and cooperation among different actors and entities to be successful; 7) they necessitate new forms of regulation and governance; and 8) they presuppose new business models to remain sustainable over time (Dogruel, 2014: 52-69).

Challenges Associated with Innovation in the News Media

Not being a recent practice in journalism, innovating is associated in recent years essentially with the development of apps (Fante, 2018), betting on storytelling strategies (Granado, Silva, Vicente, 2020), such as gamification, augmented reality, infographic representation (Gehlen, Sousa 2018), and binaural sound (Vicente, Pérez-Seijo, 2022), as well as redefining the organization's positioning or its business model (Bonixe, 2020: 153-169).

The migration of news media to digital platforms has generated new challenges in terms of routines, languages, deontology, and training of professionals. Major media events are seen, for example, by news companies as an opportunity to test new ways of reporting events. In Bonixe's study (*ibid.*), the papal visits to Portugal were used by radio stations to launch 360-degree videos, live and continuously.

In Spain, one of the most significant innovations is the adoption of digital technologies for the production, distribution, and consumption of content. This has allowed news organizations to reach wider audiences, engage with readers in new ways, and test new ways of storytelling. For example, El País launched a virtual reality app that allows audiences to experience news in immersive 360-degree environments (García-Avilés et al., 2019).

The study by Meier (2022) found significant differences between the five European countries studied in terms of the innovations adopted

(Meier et al., 2022). While Germany and Switzerland focused on the creation of new multimedia formats, Spain and Italy focused more on the use of social media. In parallel, Austria was the country that most implemented data analysis tools in its journalistic work. Although most European media outlets have adopted social media as a tool for news reporting, some countries, such as Spain and Germany, have been more successful in effectively integrating these platforms into journalistic work.

Innovation and its integration are a complex process that requires a combination of resources, collaborative leadership, and a predisposed organizational culture (García-Avilés et al., 2019; Meier et al., 2022; Pérez-Seijo and Vicente, 2022). Many organizations have limited resources to invest in expensive innovation, which can make it difficult to adopt new technologies and infrastructure (García-Avilés et al., 2019; Meier et al., 2022; Pérez-Seijo and Vicente, 2022).

Journalists and other professionals may be more resistant to using new technologies because they feel that they undermine their primary mission of reporting events or because of the perception that they may threaten their work, but also because they lack the technical skills to implement them effectively (García-Avilés et al., 2019; Meier et al., 2022; Pérez-Seijo and Vicente, 2022).

Meier et al. (2022) point out that sustainable business models are scarce. Several innovations have been shown not to be economically viable in the long term, which can make them difficult to adopt and cause companies to fear them.

The need to find a balance between innovation and traditional journalistic values takes on special importance in the use of artificial

intelligence in newsrooms (Meier et al., 2022; Pérez-Seijo and Vicente, 2022). Studies such as de-Lima-Santos and Ceron (2021) and Pérez-Seijo and Vicente (2022) have identified that, in addition to the lack of financial resources to invest in these technologies and the difficulties in finding qualified professionals, there is a clear concern about ethics and data privacy associated with the lack of understanding of how artificial intelligence can be used in the service of journalism.

To explore these factors and how they influence media innovation, García-Avilés et al. (2019) interviewed twenty journalists who were managing innovation projects in Spain. Faced with declining revenues, the companies implemented new business models, such as sponsored content and hosting events, as well as new content production, such as virtual reality and interactive infographics.

The factors that conditioned the implementation of the innovation were the availability of resources and support from management (García-Avilés et al., 2019). Journalists who had access to training and other resources were more available than those who did not. In addition, having the support of management was crucial to overcoming resistance to change and ensuring that innovations were integrated into the culture of the organization.

Overview of Journalism Innovation in Portugal

In a survey of 236 Portuguese journalists, Cardoso et al. (2019: 25) identify that 64.8% have an academic background in communication

sciences. Journalists face significant challenges in their work, such as the pressure to produce content quickly and the lack of resources that can constrain innovation in the industry.

The OberCom report (Cardoso et al., 2019) also provides, albeit little, information on journalists' perceptions of innovation in newsrooms. Most respondents (60.5%) consider the use of new technologies important to improve journalistic work.

The study by Crespo et al. (2018) reinforces that news companies in Portugal are slowly adapting to new practices, favoring the use of different available narratives, and editing with new publishing tools. Legacy media were at an early stage of searching for new sources of revenue beyond traditional advertising. The rate of innovation in startups' business models was even slower since they did not have economic shortages. In natively digital media, the search for new revenue streams was very much on the board (Crespo et al., 2018: 100).

During the Covid-19 pandemic, journalists adopted new routines, such as working remotely, conducting interviews by phone or video conferencing (Miranda et al., 2021). To cope with information overload and adapt to constantly changing news related to the pandemic, some journalists chose to focus on reliable and verified sources, while others used monitoring tools to filter relevant information (Miranda et al., 2021: 298).

Looking at the Portuguese case through case studies, Bonixe (2020) notes that broadcasters have sought to progressively adopt "measures at the level of their organizational structure that stem from their presence on the Internet. (...) These measures are of various levels: convergence between traditional radio and digital platforms,

adoption of multimedia tools, brand expansion and professional profiles” (ibid.:158).

In affirming radio on the aesthetic, creative and informational planes of the digital medium, static and animated infographics began to be used in the construction of stories, as well as photography, photo galleries, videos, 360 degrees, streaming broadcasts, graphic information, creation of spaces for listeners to participate in debates through comments left on the website and other digital platforms, geolocation and timelines for chronological events (Bonixe, 2020: 158).

As for the dimension of capitalizing the online presence with the creation of new products, Bonixe (2020) highlights the creation of newspapers in pdf and a radio for the deaf, with translation into Portuguese Sign Language of the sound broadcast. The sound reports mostly use binaural technology (Vicente and Pérez-Seijo, 2022).

The study by Fante (2018) reports that some companies are developing apps. The apps, two from the press (Expresso and Público) and one from the digital media (Observador), have features such as notification, geolocation, and content customization to offer a more engaging and interactive experience to customers. However, the author identifies that the multimedia character is little diversified (Fante, 2018).

The four journalists interviewed in the study by Gehlen and Sousa (2018), who work in the field of data journalism, in Expresso, Público, and O Jogo newspapers and Renascença radio station, mention that data can be worked to produce multiplatform reporting on any topic, from politics, economics, sports to the environment. However, the task of working with data implies a rigorous process of analysis,

treatment, and multimedia editing of the information into infographics. The need for investment in training and capacity building of professionals or the hiring of human resources are the main obstacles to its consolidation in Portuguese journalism.

As for innovation in news coverage of Covid-19 in Portugal, the press continued to focus on storytelling formats and data journalism, with immersive, empathetic, and explanatory narratives. Some Portuguese newspapers, such as Público and Expresso, created specific sections on their websites dedicated to Covid-19 coverage. These sections included up-to-date news, the visualization of data through interactive infographics and maps, and information on prevention and treatment measures (Silva and Granado, 2021: 12).

Gamification of news

In 2013, the most popular New York Times story was not an article but rather an interactive story called “How Y’all, Youse, and You Guys Talk”. Considering that the newsgame was launched on December 21 of that year, it took 11 days to generate more hits than any other linear or multimedia journalistic text (Meyer, 2014). It is increasingly common to see regular newsgame launches, particularly in the largest international media outlets. The study by Ferrer-Conill et al. (2020) offers a panoply of examples, from The Financial Times’ award-winning “Uber” project to “A World without Chocolate”, an independent collaboration between Spain and Italy that was simultaneously published in El Period, Al Jazeera, Tages Anzeiger, and La Repubblica.

Cattani and Amaro (2018) argue that newsgames can serve as a complement or constitute new business models for traditional journalism by attracting new types of advertising and new customers, because of increased visibility through shares on social networks and traffic generated on websites. Regarding the investment required, the authors point out that many international projects are crowdfunded. This practice of collective funding can involve many people interested in supporting innovative journalistic projects.

As a form of innovation, it allows users to interact with important topics and better understand the context of the knowledge one wants to convey through a news game. Newsgames can be defined as games created from real events, making information more accessible and interesting (Bogost et al., 2012; Cattani & Amaro, 2018). Events are at the basis of the narrative and gameplay of this form of interactive journalism that has the dual purpose of informing and educating the “players” about those topics. Often the stories would be complex and difficult to understand by other traditional journalistic means (Bogost et al., 2012).

Newsgames can also be a way to promote media literacy, helping journalistic audiences develop critical skills to filter information in the digital age (Cattani & Amaro, 2018). On the other hand, these are used in the higher education of students at the level of journalistic writing and the development of interviewing techniques (Aoki, 2020). The potential to amplify the diversity of voices and perspectives in journalism allows different social groups to be represented and heard (Cattani & Amaro, 2018).

Newsgames can also be considered tools that break barriers between journalists and audiences, if they are used by news companies with

the collaborative goal or to stimulate participation (Aoki, 2020). In the first dimension, audiences can intervene in the construction of the game through open codes. In the second, they allow them to experience the news in a more engaging way, whose participation enables organizations to collect and analyze data from participants.

In the gamification of news, Bogost et al. (2012) stated that the great challenges for newsrooms lie in finding the right balance between gameplay and information, ensuring the transmission of information that is accurate and relevant from the world and therefore understandable to a wide variety of audiences, as well as ensuring that “players” are not led by the game narratives to wrong or biased conclusions.

As in Portugal the adaptation of the business model of journalistic companies occurs slowly and there are no scientific studies on news-games, an exploratory interview was conducted on April 12, 2023, to structure the questionnaire survey that is presented and discussed in the following sections.

We interviewed Diogo Queiroz de Andrade, director of innovation at Global Media Group, one of the largest media groups in Portugal and with presence in the press, radio, and digital sectors. He has over 25 years of experience, making him one of the most knowledgeable people in the digital journalism market in Portugal.

Andrade (2023) framed newsgames as part of the diversification of digital news formats, which have been “one of the elements that most contributes to attracting new audiences” and to respond to the industry crisis, as it “forces us all (rightly) to understand how we can better serve our customer.”

His definition of newsgames highlights not only the immersive context in which information is conveyed to the reader in a subtle way, but also the narrative context “that appeals to emotional factors”. He suggests that this appeal is at the genesis of the interaction between the consumer and the product, and that the nature of the format does not change the essential journalistic criteria.

When asked about the main challenges of this innovation process, Andrade (2023) mentioned the creation of a product that makes sense, conveys information, involves the reader, and triggers an emotional response. In this context, not all news topics are likely to be transformed, which represents an inherent limitation to the viability of the model.

In terms of production, the difficulties relate to the conservative mentality dominant in organizational cultures in Portugal and the need for programming and design skills, something that the current human resources do not possess.

Contrary to what one might think, journalism is a rather conservative profession where innovative practices enter very slowly and against a lot of resistance. The gamification of news is already a reality, the shift towards greater adoption of this and other formats has precisely to do with the need to be more open to innovation.

(Andrade, 2023)

Methodological Choices

For the present study, we are interested in starting from the vision that innovation can be seen as a way for the news industry to find new business models and respond to the challenges imposed by the digital public space. Especially due to the democratization of the process of creating and sharing content to any user, which contributes to capturing attention, since this method sustains the business model of news companies. In this context, the difficulty of journalism to engage the public in an increasingly fragmented and personalized environment between digital platforms emerges (Pérez-Seijo and Vicente, 2022).

Although several innovative strategies have been identified in Portugal, it is necessary to understand how these projects are effectively integrated into newsroom routines in order to consolidate their use (Bonixe, 2020).

This paper aims to explore the implementation of newsgames as a form of journalistic innovation in Portugal and to understand what challenges are faced by organizations. The research is guided by the following research questions:

RQ1: To what extent does declining revenue promote the creation of newsgames?

RQ2: What were the challenges associated with news gamification?

RQ3: How does innovation enable media to respond to changes impacting the business model?

The survey has been considered as a method that “provides a quantitative or numerical description of the trends, attitudes, or opinions of a population by studying a sample of that population” (Babbie cited in Creswell, 2009: 29). García-Avilés et al. (2019) demonstrated that practitioners’ experiences provide insight into the context and factors that shape the process of journalistic innovation.

Using a mixed methodology that allowed flexibility in the vertical analysis of the key aspects of innovation in the media (administration of evidence), we opted to construct a questionnaire survey consisting of 15 open questions in the form of a semi-structured dialog (Appendix 1). The survey sent by email was applied during the time window from April 28 to May 31, 2023. The selection of the non-probability convenience sample (Bryman, 2012) was designed to reflect all innovative media of different typologies (press, radio, digital, and television) and to consist only of professionals who have participated in the creation of newsgames.

The sample, presented in Figure 1, is composed of 5 male and 5 female individuals, working in the press (70%), digital journalism (10%), television (10%), and radio (10%). All Portuguese media that have launched newsgames are represented, namely *Expresso*, *Observador* and *Público*. This means that the two participants from *Rádio Renascença* and *CNN* have worked previously in these media.

Figure 1: Media outlets of the sample (n = 10)

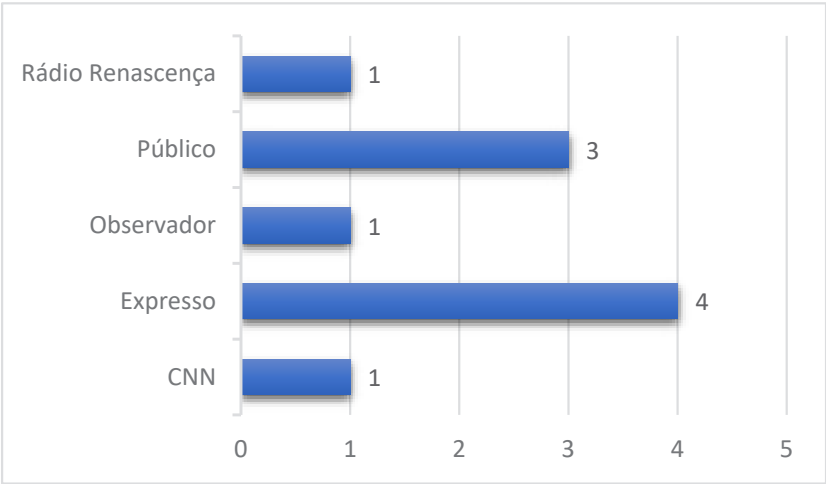


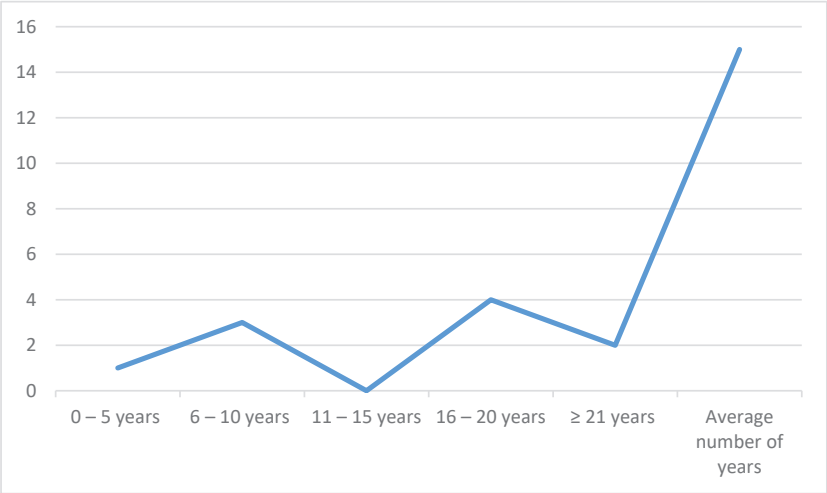
Table 1: Roles in the newsroom

Role	Absolut Frequency	Percentage
Multimedia Coordinator	2	20%
Web Designer	2	20%
Editor-in-Chief	1	10%
Deputy Director	1	10%
Online Editor	1	10%
Journalist	1	10%
Data Journalist	1	10%
Infographic Journalist	1	10%
	n = 10	100%

As can be seen in Table 1 and Figure 2, the sample is diverse in the positions they hold in newsrooms and reveals long longevity and professional experience. The average number of years that the participants

have been in journalism is 15 years. Directors, editors, coordinators, and newsroom chiefs represent 50% of the sample, who joined the newspaper industry at least 16 years ago. In addition to management and leadership positions, the other half correspond to positions as web designer, journalist, data journalist, and infographic journalist.

Figure 2: Professional Experience



This study is the result of a qualitative descriptive analysis of the data from the survey, with primarily expository objectives for the information collected and some simple quantitative observations. The data presented below is not intended to exhaust the approach to the reality of Portuguese journalism in terms of newsgames.

The empirical content analysis tool was used with the aid of MAXQDA software to combine qualitative and quantitative analysis techniques to interpret and determine some patterns and meanings of the content conveyed through the textual responses (Bardin, 2016/1977). The categorization matrix was constructed by deductive and inductive

methods, from the literature and the data under analysis, respectively (Elo and Kyngäs, 2008; Mayring, 2000).

Thus, in the first phase of coding, we characterized the participations according to the following variables: gender of the participant, media outlet, position, and professional experience.

In the second phase, we analyzed the dimensions and respective categories, with only one sublevel, identified from the literature and coded according to each description (category memo): newsgames concept (audience participation and not referencing audiences), genesis of the first project (migration to digital, revenue drop, new business model, content complement, international projects, multimedia experiences, new audiences, and boosting engagement), participation in projects (number of projects and function performed), creation process (stages and journalistic criteria), innovation challenges (playability-information balance, leadership, organizational culture, government regulation, financial factors, technical skills, human resources, time spent, financial return, application structure and speed of development), audience receptivity (good, poor, incipient, can't respond), ways to measure return (social media metrics, website metrics, and new customers), journalists' perceptions of innovation (harms journalistic mission, threatens work, response to changes affecting business model, ethical issues, informational relevance, attracting new audiences, and active audience engagement), and other ongoing innovations (social media, new multimedia formats, data analysis tools, adoption of digital business models, artificial intelligence, doesn't know how to respond, and digital transformation).

In this way, the questionnaire represents the unit of analysis of the database, while the unit of analysis of the corpus or record is the answer

to each open question. During the analytical process, the dimensions were not coded, as they correspond to nominal variables. The category characterizes the content, which is not the case with the dimensions or concepts.

The absolute frequency values shown in Tables 2 and 3 are the result of one of the features of the MAXQDA software. Each reference, even synonyms or expressions that point to the same value, was counted when it referred to one of the previous categories. The categorization process was carried out once, discussed and repeated a second time by the researchers in June 2023, in Portugal, to minimize subjectivities arising from the coding process (Lupton, 2006). At the request of some participants, anonymity will be granted in the reporting of their statements. For this reason, all identifications are merely fictitious names.

Discussion of Results

The snapshot of the documents (Figure 3) makes it possible to compare how the codes were assigned across all the paragraphs in the documents. As this visualization is proportional to the size of each document, most of the coded segments belong to the dimensions “innovation challenges” (78, 35%), “participation in projects” (37, 17%), and “journalists’ perceptions of innovation” (25, 11%). The disparate relative proportions of the categories under analysis show that there is no fixed sequence of themes mentioned by the participants, even though the questionnaire survey was constructed in a semi-structured way.

Figure 3: Document comparison chart

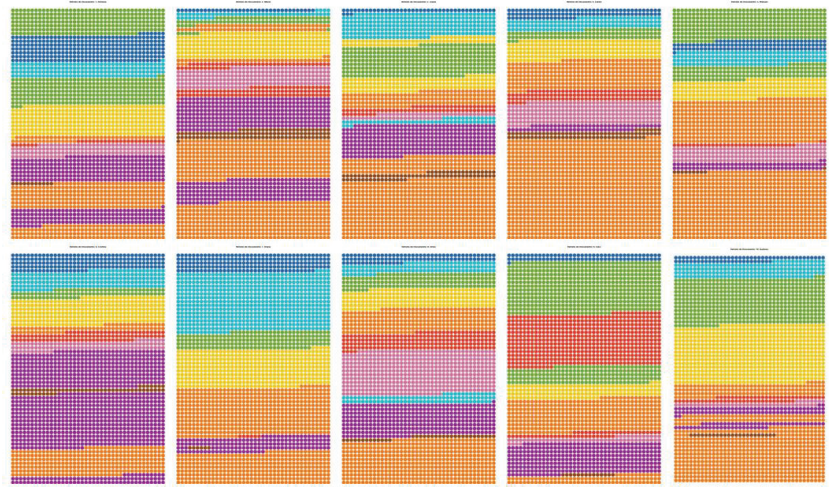


Figure 3: Document comparison chart

- Figure legend:**
- > CREATION PROCESS
 - > PARTICIPATION IN PROJECTS
 - > GENESIS OF THE FIRST PROJECT
 - > INNOVATION CHALLENGES
 - > JOURNALISTS' PERCEPTIONS OF INNOVATION
 - > NEWSGAMES CONCEPT
 - > OTHER ONGOING INNOVATIONS
 - > AUDIENCE RECEPTIVITY
 - > WAYS TO MEASURE RETURN

In the dimension “newsgames concept”, it is identified that 70% of the newsgames definitions presented by the journalists do not mention the importance of this innovation to stimulate the active participation of the public, either in the news consumption or in the process of news gamification itself. Gustavo, fictitious name, explains that it is a “diffuse concept” that sometimes generates diverse and misunderstood interpretations.

Manuel’s definition was the one that best fit the initial conceptualization of Bogost et al. (2012) and supplemented with inputs from Cattani and Amaro (2018). See his explanation.

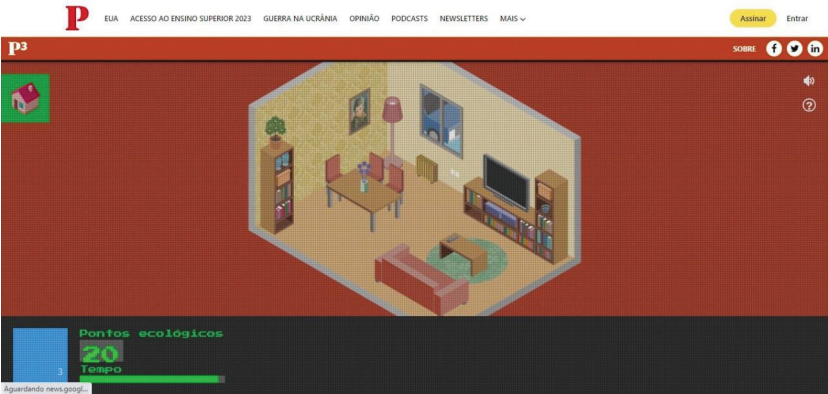
Some people in the field will define newsgames as a type of game built with journalistic principles and whose goal is to inform readers by putting them at the center of—or as part of—a story (usually complex or best explained in the first person). I prefer a reverse and broader definition: they are a form of gamification of news or information, with the goal of engaging and motivating readers in a story or topic. (Manuel, 2023)

In recent years, some newsgames projects have been sporadically launched in Portugal. Examples are “Eco’a Breca” from Público in September 2019, “Consegues Sobreviver como um estudante universitário?” from Expresso in September 2022, and “Costa Strike” from Observador in May 2023.

“Eco’a Breca” (Figure 4) was one of the first newsgames in Portugal, and it allowed users to explore ecological challenges inside their homes, related, for example, to water or energy consumption in everyday tasks. The interface is simple, with images of the interior of a house representing several rooms, but very functional from the point of view of gamification and the information it intends to pass on to users, who collect ecological points until they reach a goal of 200.

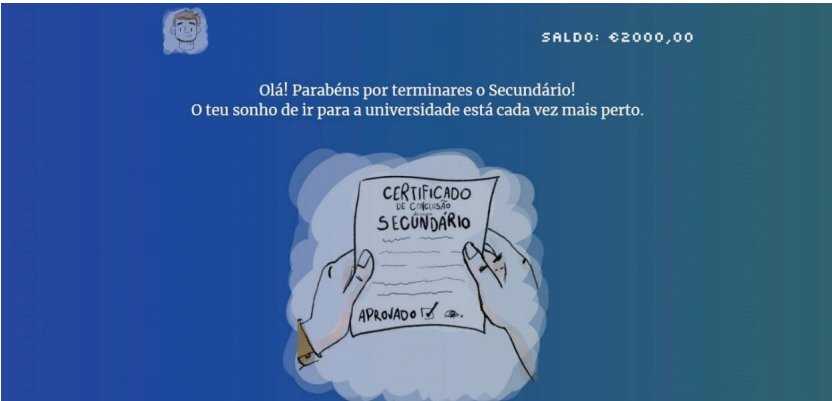
“Consegues Sobreviver como um estudante universitário?”, that means “Can You Survive as a University Student?”, (Figure 5) came at a critical moment in Portugal, when student room prices rose by up to 70% from one year to the next, which led to many having to look for new accommodation solutions or even giving up studying. This game explores the management of a budget, so the user can put themselves in the shoes of a student far from home and manage their money

Figure 4: Application structure of “Eco’a Breca”



according to the challenges of everyday life. This narrative gets users thinking about the challenges students face and their dilemmas.

Figure 5: Application structure of “Consegues Sobreviver como um estudante universitário?”



In the third example, the newsgame “Costa Strike” (Figure 6) comes amid controversy in national politics. Costa is the prime minister. And he is in trouble due to a succession of controversial events in one of

the most important ministries, including the minister, a stolen computer with confidential information, and scenes of violence in ministerial offices. The game is more entertaining than informative, but, as in all political crises, it puts Costa face-to-face with all the players in this political game.

Figure 6: *Application structure of “Costa Strike”*



The participants refer that newsgames arise essentially to test new multimedia formats and add value to content. At no time was mentioned the goal of constituting a new business model, the drop in revenue or innovation resulting from the migration of media to digital. For example, at Expresso newspaper and Rádio Renascença, newsgames were born to test new multimedia formats and add value to news content.

As for the role played by the participants, one can see that, given the lack of human and economic resources of newsrooms in Portugal, there are no well-defined roles. In the absence of multidisciplinary teams and with little technical knowledge of programming, Diana mentioned that, while in the first project she focused on prototyping,

in the second project she was asked to play the role of journalist and web developer, having had the collaboration only for the illustrations. Gustavo, data journalist, pointed out:

I end up being responsible for almost all the work – even though it is always collaborative work with the editorial staff. Usually, I am the author of the ideas, or if it is just a theme (the typical “I should do something about [the theme],” I am the person who is responsible for coming up with a more creative solution. (Gustavo, 2023)

Although there is no common newsgames creation process for all newsrooms, it is possible to identify in the participants’ responses several good practices that can be replicated and applied by other media companies, namely:

- **Research and theme discussion:** initial meeting between journalists, designers, editors, editorial coordinators or heads, and directors to discuss ideas, possible paths and reach the best way to tell the story based on the type of information that at the outset is thought to be needed. Example of questions used in this phase: What story do we want to tell? Is the angle of the story still the same? What is the amount of data? Will it be a more multimedia game? Is it interesting to incorporate videos or other elements?
- **Conception and Design:** in this editorial production phase, after research and information gathering, the journalists create the script where the concept is defined, the places and challenges

proposed in each section are identified, and the form and punctuation scale are defined, as well as the textual elements to be included.

- **Programming and design.** The first phase is the idealization of the prototype, sketching wireframes or data-driven (codes for the latter case), and the delineation of the functionalities that the game will have by the programmers and web designers. Then operationalization consists of designing the environments and developing the program schema. Next, programming begins and the creation of illustrations and other graphic solutions to incorporate the editorial production.
- **Testing and bug fixing phase:** because it is an iterative process of research and development, as soon as it is possible to test minimally, the programmers share with journalists to adjust, changes, and incorporate definitive texts, already chosen images, among others.
- **Publication, distribution and promotion** on the homepage, social networks, newsletters, among others.

All participants mention that the journalistic and ethical criteria for newsgames should be the same as for all other written or image content published in the media, to which can be added those of a technical nature, namely functionality, usability, image.

Proximity, relevance, and novelty were the most prominent news criteria. Still, there are themes with more potential for readers' involvement, through discussion, exchange of perspectives and sharing on social networks.

Gustavo pointed out that proximity is defined by several authors as a news factor. However, in newsgames this proximity is emotional in addition to geographical. “With some of these features, it is possible for us to give personalized information based on the user’s geography – which, by its nature, is clearly more relevant. But at its genesis, the editorial and journalistic criteria are always the same.” For you, news-games are just a way of building the narrative.

As we can see in Table 2, among the challenges associated with innovation, human resources are the most invoked by the interviewees for this research. In second place is the time spent. And then there are technical skills. The CNN Portugal participant points out that newsrooms are still too focused on fast news.

“At this moment, I think that newsgames in Portugal are still isolated experiences, given the time and resources needed to develop them. In newsrooms increasingly consumed and dominated by the production of fast news and with more and more economic constraints, I think there is still a long way to go before we can say that newsgames are part of the informative strategy of a national media organization.” (CNN Portugal, 2023)

The Renascença participant corroborates and complements this idea. “Especially the development, in the projects that are ours from scratch, because we don’t have a dedicated team of developers. And time. They are usually time-consuming and complex projects that involve several iterations”.

About the shortage of technical skills in the newsrooms, one of the respondents of *Espresso* believes that administrations should allocate part of the budget to professionals specialized in technological areas.

The proximity of the IT sector to the newsroom; the ability to hire people with both journalistic and IT skills, which are in short supply; administrations must open up a budget gap that allows for long-term investments, so that these jobs stand out. (*Espresso*, 2023)

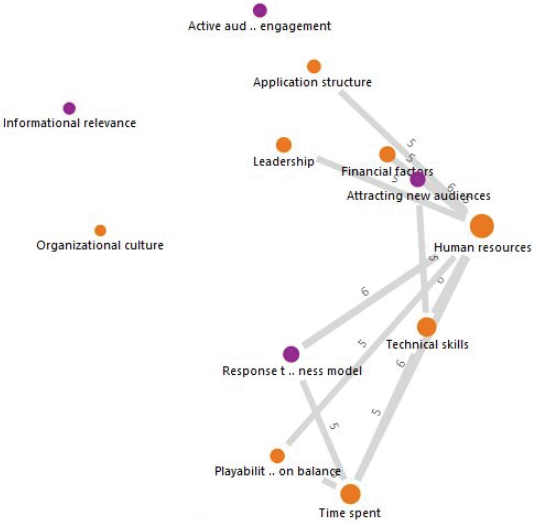
In fact, financial issues are another challenge that many point out as being associated with innovation. With less frequency in the answers but with great strategic implications for media companies, leadership and organizational culture are two aspects focused on. Financial return and speed in development are also among the concerns.

Table 2: *Challenges associated with innovation*

	Absolute Frequency	Percentage
Human resources	18	23,1
Time spent	13	16,7
Technical skills	12	15,4
Financial factors	8	10,3
Leadership	7	9
Game-information balance	6	7,7
Application Structure	5	6,4
Financial return	5	6,4
Speed in development	2	2,5
Organizational culture	2	2,5
Government regulations	0	0
TOTAL	78	100

The code map (Figure 7) shows the relationships between the codes in a document for the dimensions “innovation challenges” and “journalists’ perceptions of innovation”. For a frequency of five or more, human resources, the main challenge of innovation, are often associated with technical skills, financial factors, attracting new audiences, and responding to changes affecting the business model. This means that, although innovation is seen by the participants as a way of responding to economic provocations and attracting new customers, newsrooms need new human resources whose skills involve challenging investments for a business model that has been in crisis for several decades. The organizational culture category is distant from the other clusters and has no established relationship, suggesting that it is not an obstacle in the Portuguese context. However, leadership is pointed out as a constraint.

Figure 7: Map of relationships between the codes for the dimensions “innovation challenges” and “journalists’ perceptions of innovation”



We used a document map (Figure 8) to see if there was any similarity between the documents in terms of the codes and variables assigned. This showed that there are two sets of documents with high similarity.

Figure 8: *Document map*



To recognize which variables may influence the views and positions of the newspaper industry in relation to innovation, two similarity matrices were applied to analyze the similarities between the documents of the participants with the same positions (Table 3). Maria, Carlos, and João, as well as Gustavo and António, have the same positions, the former as managers and the latter as technicians, suggesting that they tend to share the same opinions or value certain subjects more than others.

Table 3: *Similarity matrix of the documents according to the variable “management positions”*

Document name	2. Maria	3. Joana	4. Carlos	8. Sílvia	9. João
2. Maria	1,00	0,78	0,78	0,70	0,83
3. Joana	0,78	1,00	0,78	0,61	0,78
4. Carlos	0,78	0,78	1,00	0,65	0,74
8. Sílvia	0,70	0,61	0,65	1,00	0,74
9. João	0,83	0,78	0,74	0,74	1,00

The good receptivity to newsgames by the public was highlighted by 90% of the sample, and 10% didn’t know how to answer. There are essentially 3 ways to measure the return on investment, namely website metrics, mentioned 9 times, social media metrics, mentioned 4 times, and new customer acquisition, which was mentioned only 1 time.

The mechanisms commonly used on websites are creation of triggers in the code that detect certain actions on the special page, the length of the ‘scrolled’ reading, the times on the page, specific buttons, and various navigations. The return on social media is measured by the engagement that these projects generate in sharing and discussion.

From a journalist’s perspective, innovation comes in response to both business needs and new ways of reaching audiences. A perspective well reflected by one of Observador’s respondents.

“I believe that all innovation efforts, in a journalistic context, that allow bringing audiences closer and involving them with the news are extremely advantageous. On the one hand, they may have an impact on the viability of the business model by generating potential new readers. But also, because it is the obligation of journalism to adapt to the forms of consumption of news and reports, so that our work has the widest possible reach”. (Observador, 2023)

As shown in Table 4, for the newsroom professionals, innovation comes up as a response to changes affecting the business model with an absolute frequency of 32%. “New formats and innovation are essential in responding to change. Of course, the balance between time invested and immediate results is never balanced in the start-up phase. The time invested is almost always much greater than the immediate result”, as one of the participants from Expresso said.

Regarding the publics, the absolute frequency of responses is 28% for attracting new audiences and 20% for active involvement of the public. As the Renascença respondent says:

We believe that only by investing in new formulas can we reach new audiences and combat the complex challenges that the business faces. Looking for these formulas, experimenting, failing, and trying again is, in our view, crucial to finding more interesting paths for journalistic content and better results. Formulas cannot, however, distract from the essential: doing good journalism with criteria and balance.

Finally, about innovation, informational relevance appears with an absolute frequency of 12% in the answers; 4% point to threats to the work of newsrooms, and 4% to the minimization of the journalistic mission. No one mentions ethical issues.

Table 4: *Journalists' perceptions of innovation*

	Absolute Frequency	Percentage
Response to changes affecting the business model	8	32
Attracting new audiences	7	28
Active involvement of the public	5	20
Informational relevance	3	12
Threatens the work	1	4
Undermines the journalistic mission	1	4
Ethical issues	0	0
TOTAL	25	100

On the question about ongoing innovations, half of the participants do not know how to answer because of lack of knowledge. This suggests that boards and other management positions do not engage the entire organizational culture around change. As for the other half of the sample, 3 media are developing new multimedia formats, 1 is continuing its digital transformation, and 1 is exploring the potential of artificial intelligence for processes related to data development, analysis, and processing.

Conclusion

The news media have sought to enhance their presence in the digital environment. Not only as a means of survival, but also to assert themselves on an aesthetic, creative and informative level. In this multi-platform and multimedia context, there is a need to conduct longitudinal studies that follow the implementation and impact of innovation projects (García-Avilés et al., 2019).

Portuguese journalism strives to keep up with the new paradigm shift that characterizes Industry 4.0 to find possibilities to connect and build loyalty among different audiences on different platforms, while maintaining its credibility and relevance in the market. Still, the severe economic crisis it has faced in the last decade has reduced teams that have neither the time nor the technical skills to develop and test new forms of innovation.

The sporadic creation of newsgames projects is seen by companies as a new, more visual, interactive, and immersive way of telling real events. As an innovation, newsgames are not without risks, where a poorly conceived or executed narrative can create biases or prejudices on the part of the reader.

Besides the various human and technical resources, the main challenge associated with this form of innovation is the fact that the media have not yet managed to find a way to monetize it. As Pérez-Seijo and Vicente (2022) argue, this new form of storytelling and gamification is not a magic solution to all the problems of journalism, so different multimedia formats and business models should complement each other. Still, one cannot fail to highlight the importance of

newsgames to keep audiences informed and engaged, who can also be involved in the construction processes.

This complex and constantly evolving process requires a careful and collaborative approach to ensure that technologies are used effectively and responsibly. Collaboration and knowledge sharing between media and other industry players, such as universities and technology companies, are important in helping media overcome some of the challenges associated with innovation, such as lack of resources and sustainable business models.

While the study provides valuable information on how newsgames emerge in the media sector in the form of innovation, and some of the findings can be applied to other contexts, it is not without limitations. It should be taken into consideration that the study focused specifically on Portuguese media and on a convenience sample. All professionals involved in newsgames projects were considered and invited to participate.

The main limitation of the study is the choice of the data collection method (questionnaire surveys constituted only by open questions). Participants do not always give the necessary reflexivity to each topic. Future studies should seek to explore, mainly through semi-structured interviews, the extent to which cultural and institutional factors influence the diffusion of innovation in different regions or countries and explore the perspectives of other stakeholders, such as publics and advertisers, who can also play an important role in defining and promoting innovation in the media industry.

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Annex 1 – Questionnaire survey

1. Can you explain to us what you mean by newsgames?
2. How did you come up with the idea of creating the first newsgames project where you work?
3. How many and which newsgames projects have you worked on?
4. What was your role in this project/s?
5. What are the stages associated with their development?
6. What journalistic criteria are used in the gamification of the news?
7. What were the main challenges?
8. What was the public's receptivity to the project/s?
9. How do you measure the return on this investment?
10. To what extent does innovation allow you to respond to the changes that impact the business model of the journalism industry?

11. Can you share what other i4.0 initiatives have been developed or are being planned at the media outlet where you work?
12. How would you define Portugal's state of the art in newsgames?
13. Do you think newsrooms should invest more in newsgames in Portugal?
14. In your opinion, what is the reason for not having so much investment?
15. What needs to change in the newsrooms for the gamification of news to become a reality?