

Article

Local News and Geolocation Technology in the Case of Portugal

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Abstract: New projects have recently emerged to develop geolocation technology for the publication of local news in Portugal. These types of new initiatives open the possibility to explore new media perspectives, identifying emerging directions and opportunities to develop more competitive ways to publish local news. In this work, we study these ideas and to what extent they can be used to cope with the challenges that the local Portuguese press is currently facing. We provide local news editors with information to further develop their e-participation and news publishing activities. To this end, we present 10 indicators that measure geolocation technology that has been successful in providing attractive services to local consumers. Lastly, we analyze five Portuguese apps by means of the proposed guideline. Our work shows that the use of geolocation technology has a great potential for local journalism in Portugal but nevertheless we still find flaws in their implementation.

Keywords: geolocation technology; news publishing; local journalism; Portugal; social dimension of news publication; public access and engagement



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1. Introduction

Local journalism constitutes an integral part of local life, where the journalists not only report local events but stimulate local debates and keep a watchful eye on those in power. However, over the last decade, the local press has been transitioning to a more digital environment, which, in turn, has produced a decline in the number of local newspapers and local journalists [1–3]. While in 1998, there were 1153 local media outlets in Portugal, this figure decreased to 790 in 2016 [4]. For this reason, an increasing number of journalists and researchers have raised concerns about the social implications of this transition. Significant cuts in local journalists' staff could affect the plurality of news sources, the visibility to local citizens, and therefore, produce a democratic deficit at the local level [5].

In Portugal, the position of the local press has recently become more severe as much of the financial support has been reduced [1] and now, because of the impact of COVID-19, the sector is heading to an agonizing scenario that only gets worse with each passing day ([6] Portuguese Journalist Union, 2020). This is particularly dramatic since, historically, the local press has played a central role in the country, having around 50% of the national share market [7].

The digitalization of local newspapers and, in particular, the rise of technologies based on geolocation technology, has completely changed the way in which the sector operates. This has led many local Portuguese press organizations to close their doors due to their inability to adapt to this new context and to understand the preferences of online users. However, while many local newspapers are facing difficulties, new and innovative forms of news content and information access started to gain prominence in some countries, including Portugal [8]. Even if only residual, the production of mobile news appears as a new experience carried out by local journalists [9]. Funded by private large corporations, such as Google or the European Journalism Centre (EJC) in partnership with the Facebook

Journalism Project (FJP), new projects have emerged in Portugal to develop applications oriented towards fostering local journalism [10]. This type of new initiative opens the possibility to local Portuguese media organizations and journalists to seize advanced technological tools that allow them to explore new mediascapes and provide customized and modern services.

The features that persist in local areas of the country can be beneficial to the maintenance and stability of the local press [11,12]. In this context, the cultivation of proximity and preservation of identity, cultural and historical ties are of the greatest importance. Additionally, the presence of faithful subscribers and, in the case of Portugal, the proximity to the immigrant/emigrant communities, play a crucial role in the Portuguese context. In this work, we analyze the situation of journalism in Portugal and study how the irruption of geolocation technology posed new challenges and possibilities to this sector. We examine how the Portuguese cultural and socio-economic idiosyncrasies can be used by local journalism to provide personalized appealing services to local communities using geolocation functionalities. In this work, we focus on local newspapers and do not consider other local media, such as radio, television, or online-only news organizations.

We also aim to provide local news publishers with information to further develop their collaboration with users and news publishing activities, delving into the new possibilities that geolocation technology brings to local journalists. To this end, we propose 10 indicators that measure how mobile applications of local news have been successful in providing appealing services to local consumers. This guideline is meant to help local journalists identify emerging directions and opportunities for local journalism in the context of devices with geolocation technology. Lastly, we put forward, through the proposed guideline, five case studies of Portuguese apps. We conclude the paper with a discussion of the implication of the findings and recommend future avenues for research.

2. Theoretical Background

The design of the proposed framework is based on some relevant theoretical and empirical research presented in the literature in the area of geolocation technologies and local media. Local information is crucial for the preservation of tradition and memory and helps local people imagine themselves as part of a community, connected through their local news organizations and is essential for healthy democracies. Local media focuses on a narrow geographical area seeking to find a niche among the service gaps left by mainstream media. However, traditional media providers have found it difficult to adjust their cost models to local areas [13]. For this reason, it was argued that geolocation technologies offer a potential revolution for local media that can deliver at this level of scale. Moreover, local media is now of particular interest given the rapid take-up of connected devices, such as mobile phones which enable users to consume local news in new ways and may help to drive new business models towards long-term sustainability [14].

Hence, local journalism is changing today as part of a wider structural transformation of our media environment, driven in large part by the rise of digital and, in particular, by location-based technology. Ref. [15] shows us that despite declines in subscriptions, advertising revenues and lack of sales and own resources, the local press sector continues to prioritize the economic importance of their print products. However, they also believe that the sector needs to better understand the news organizations as the growth of local news is driven by mobile news consumption behavior [10,16]. This still ongoing media revolution involves changes in providing new ways for accessing, finding, and sharing content that challenges the classical business models and journalistic routines of established local news media. One of the main features of local news is the central and fundamental role played by the reader's input and interaction with the journalist, in contrast with the less personalized association in the mainstream media [14,17–19]. Ref. [5] showed that there is a fast-growing general trend for an open and collaborative approach by local media to participate with the local public to co-produce news content. The authors concluded that the central factor for this type of news is the use of online tools to promote the participation

of the public. In this context, the use of geolocation technologies for exploring locational information has gained a lot of interest in recent years.

2.1. Location-Based Applications, E-Participation and Locative Journalism

Local journalists have the advantage of being close to the issues, remaining focused on providing journalism that takes care of the needs of their communities, preserving traditional values, such as proximity and public service. Thus, local journalism can take advantage of the contextual awareness and exploit the potential of proximity to impact on key factors of engagement, through the involvement, social facilitation, and satisfaction of users [20]. Proximity is one of the most powerful factors when choosing news and, according to [21] location-based technology is challenging the traditional understanding of local news and information, expanding our perception of what is local. Local information based on social relevance becomes another type of information, closing the gap to the reality of the region concerned.

In this context, geolocation technologies play a central role in this revolution of location-based journalism. The possibilities of capturing, integrating and interpreting geospatial data have turned mobile applications into important tools to promote public participation and more citizen engagement. Indeed, there has been increasing research aiming at providing a multi-user collaborative work environment, allowing a group of people to work together in a collaborative and more democratic decision environment. Traditional journalists usually have reserved the decision-making of the work process to themselves and there are very few who have experimented with opening completely their news production to the readers [21]. However, in local journalism, users often collaborate by sending photos, videos, or comments to the news organization and these are used by online journalists to spot interesting story ideas and breaking news, such as road accidents. When the journalist finds interesting news, the reader can be contacted in order to further develop the story and turn it into a journalistic piece by the journalist. In this regard, recent studies have shown that monetary incentives (or other ways to get feedback) are useful to develop a good crowdsourcing process [22].

An important issue related to location-based services in local media communication is to understand the participation preferences and concerns of mobile users to foster the creation of news content in collaboration with readers [16,23,24]. One interesting and very fruitful way to get users to participate in the process of making news content is through location-based assignments (LBA) tasks, in which the news organization assigns tasks based on the user's mobile location [24,25]. Crowdsourcing by using tasks develops a tighter relationship between the users and the organization and it is also a very cost-effective way to generate relevant news, something that is particularly appealing for the local press. The possible tasks can vary from writing a story, carrying out an interview, shooting a photo or a video, but in all of them the location of the user when the task is received matters greatly [25,26]. Additionally, studies indicate that incentives or other ways to be acknowledged are very relevant in this context. These issues should, therefore, be considered when developing LBA tasks.

Social media is an essential space of interaction between people and a significant one for local journalism because it can extend that interaction. Even though most journalists are reluctant to share content fully produced by citizens, they recognize the relevance of social media as a tool to help them make news [27]. Social media are privileged forums for the debate on topics that bring together interests, and therefore, can be a good source of qualitative feedback from users and of quantitative data, such as the number of comments, likes and shares. Nowadays, social media constitute essential spaces of interaction between people [28]. Maintaining close ties with the communities is expected from local media but this constitutes a big challenge for editors and local reporters, as many believe that covering local issues and participating with the community online is more involved than doing so offline [29]. In a wide look to the last decade of social media studies from the field of journalism, [30] identify three assumptions: that social media would be positive; that

social media reflects reality and that social media matters most of all. On the other hand, local bloggers find it difficult to develop a critical mass of audience and to define the right business models to grow their offers into more sustainable services.

Recently, the role of social media in local journalism in Portugal to create spaces of interaction between people was investigated [31]. It was shown that although it is possible to practice journalism without social media, most Portuguese local journalists often use it to look for information, contact users, or share their own content [32]. This, however, raises some issues, especially when it comes to managing the huge amount of information received by social media. Moreover, it was found in [32] that the use of social media by local journalists to engage with the community does not differ much from other digital tools.

Besides social media, it is recommended that local press mobile applications develop their own features for location-based engagement. Thus, regarding the architecture design in shared environments [33], Collaborative Geographic Information Systems (CGIS), such as location-based services (e.g., public transport), have become an important research area over the past two decades. A CGIS system has a set of basic tools that allow: (1) shared view, control and object selection of geographical information; (2) comment of geographic (map) features with multimedia data in the form of text, graphics, photos, and audio/video clips; (3) interactive exploration of geographical data for spatial issues and (4) awareness of other collaborators and their outcomes. It is also important that there is support for multi-platforms because collaborators could use other interfaces than smartphones (e.g., PC or tablets) on different platforms (e.g., Android, iOS, or Windows).

Even though news organizations continue to adopt geolocation technologies, their potential journalistic applications remain broadly unexplored. Besides collaboration, another of these applications that are of particular interest in the local press is to take advantage of the contextual awareness to seek the potential of proximity that naturally arises from local journalism between local journalists and users [20]. When the news is delivered, the location of the user can matter greatly and so, this can be used as an interesting tool for local journalists. As discussed in [15] the sense of proximity by the users deeply affects the satisfaction and involvement in mobile journalism. For these reasons, locative media has become an innovative field that is attracting the attention of researchers and is concerned with the possibility for news to be shaped in response to place information about a newsreader in a particular location. According to [34], to assess how local news organizations and their location-based services via the mobile device demonstrate a form of spatial journalism, one can consider the following criteria: (1) communicated information via mobile device, (2) connected information to a physical space in relation to the user's smartphone location and (3) demonstrated a form of locative journalism via the geolocated news articles featured in the app.

Lastly, it is important to mention that location is considered as private information and, therefore, a key factor in a successful collaboration with the users in the news creation is to understand what affects users' disposition to collaborate and how they understand their position as participants in news creation with the local press organization [33]. The willingness to share location-based information depends on who wants to know, why the information is needed, and what precisely is asked [35,36]. Previous studies [37], found that in the case of location-based advertising, more advanced privacy settings than simple opt-in, opt-out would make participants feel more comfortable with sharing their location with advertisers and lead to sharing more information with them. Being able to control the sharing of information with rules related to the user's time, place and schedule appear to be the most resistant way to prevent users from mistakenly revealing location information they do not want to disclose.

2.2. Contingencies and Limitations of the Local Press: The Portuguese Case

In this study, we focus on the case of Portugal. For example, the adaptation of digital formats in countries like the United Kingdom is a transversal reality to all sectors of the country's population, including the most aging populations, while in Portugal the data

portrays a very different reality. Given that the overwhelming majority of the population of the United Kingdom is an Internet user [38], this implies its own idiosyncrasies in the forms of appropriation that are not comparable with a country like Portugal, where there are still about 30% of non-Internet users [39]. Moreover, if we talk about digital literacies, or the ability to appropriate and effectively use digital technologies, Portugal is even further behind, not only with respect to the United Kingdom but within the context of the European average. Moreover, based on the fact that the target audience is mainly made up of older readers who, in turn, tend to be underrepresented, this has larger implications in the ways local newspapers are consumed. Today's users have multiple ways to obtain local news, but Portuguese newsrooms have a traditional production culture based on print. However, local newspapers have been challenged in recent years. The support of the Portuguese State Government for local media has decreased [1,12,40]. An example of this is the financial support for the international distribution of local newspapers, for which state support once reached 100% and now stands at just 40–50%. This type of support amounted to 16,575,658.84 euros in 1999, having gradually decreased to 3,108,344.48 euros in 2011 [40]. According to a survey by the Portuguese Regulatory Authority for the Media (ERC), during the years after the reduction of the support, there was a progressive reduction in the number of titles in circulation in Portugal: 1153 periodical publications in the year 1998, 1366 in 2004, 1220 in 2010 and 790 in 2016 [4]. The long presence of subsidized services in Portugal delayed the implementation of an alternative distribution network but this has been slowly changing in the last few years. In 2010, only 38.9% of the local press had an Internet presence in Portugal [40], ramping up to 76% in 2020: of the total of 750 local newspapers, 416 have an online version and 157 are online-only media [32].

The inability to adapt to the fast-changing situation and incorporate modern technology resources could aggravate the situation of the Portuguese local press, which already suffers from financial constraints and overdependence on state support. There are several possible hurdles to overcome before the local press is able to incorporate these emerging technologies. A low level of professionalism of Portuguese staff combined with the lack of attention to the demands of the newly emerging public are pointed out as anachronistic elements that can be decisive for the lack of development [11,12]. In addition to this, the aging of the Portuguese population, especially in the countryside, and the challenges to the elderly for the use of technological devices, can be considered as factors that accentuate this problem in several areas in Portugal. Despite this difficult scenario, there is a great potential for the Portuguese local press as there is a long-standing tradition of consumption of local news in the country, backed by its large national market share in the last decades, which have overpassed, in many cases, the share of the larger national press organizations [40]. We cannot ignore the fact that the use of geolocation technology is growing—to access news at the local level and even in situations where the media websites do not have a responsive design [40]. Still, at the reception level, we note the fact that a recent study, carried out in several countries, identified, precisely in Portugal, that the use of mobile apps by local media emerged as a way of concentrating the community of readers in an environment controlled by the media itself, contrary to what happens for example with Facebook and other social media [8].

As pointed out by many researchers [1,11,40], one of the main features of the Portuguese local press is proximity, which keeps a very close relationship between the readers and the news organization. According to [1], this proximity is seen by the users as a platform to express and convey local community issues while preserving the local culture, customs and habits. Portuguese regional and local journalism plays a fundamental role not only in the region or place in which it is inserted but in the type of information it disseminates, maintaining strong ties between locals and the numerous Portuguese citizens scattered around the world. With a national press that does not display the same keen awareness for this type of news, the local press may become the only means of information for emigrants. Citizens who live in low-density regions, particularly in the central region

of Portugal [32] are also confronted with a similar situation, having in local newspapers a unique (and perhaps the only) tool for the valorization and development of their regions.

3. Materials and Methods

This exploratory and descriptive study aims to contribute to the growing knowledge about the identification and analysis of the applications of the local media within the Portuguese context.

To develop our methodology, we identify the central factors that are presented in the theoretical framework, focusing on the development of geolocation tools to increase the quality of local newspapers, thus improving their communication with the public. The main goal of this work is to delve into the possibilities of the local Portuguese media to explore the capabilities offered by mobile applications. To this end, this work aims to know the degree of development and adaptation to these possibilities in the context of Portuguese local media applications. More specifically, the objectives for this study are threefold:

- (1) Analyze the situation of journalism in Portugal and study how the emergence of new technologies brings new challenges and possibilities to the sector, understanding how local journalism can use these potentialities to offer personalized attractive services through apps.
- (2) Create a framework to help local news publishers further develop their digital tools and resources by taking advantage of geolocation. To this end, we present a guide with 10 indicators that measure how mobile applications of local news have been successful in providing attractive services to local consumers.
- (3) Present five case studies in which we analyze five Portuguese mobile applications of local media using the proposed evaluation framework.

3.1. Indicators

To develop a set of indicators, we identified the central factors presented in the studies carried out by [20,26,32–34,37]. The selection of these works from the academic literature to present our framework is due to the fact that these manuscripts present indicators or ideas that readily lead to indicators to assess the issues addressed in this paper. Within these works, we focused on identifying the theory developed to encourage local journalists to explore the new features that mobile phones put forward to promote public participation and citizen engagement. For each criterion, we indicate the particular study on which it is based. The 10 indicators were derived from two main questions that we consider essential:

1. How do Portuguese local journalists use geolocation tools to provide local news through mobile apps? (Table 1, below)
2. What tools do they provide for the participation of local citizens to engage in the creation of local news content? (Table 2, below)

Table 1. How do Portuguese local journalists use the geolocation tools to provide local news via mobile apps?

	General Indicators of Evaluation	Theoretical Framework
1	Offers options to receive local information, such as here, nearby, or anywhere.	[34]
2	Sends alerts of events that take place close to the user.	[20,33,34]
3	Adds news by location and places it on an online map.	[20,33]

Indicators for the analysis of the Portuguese local press apps.

The indicators that have been established to evaluate the web pages are primary information. The analysis begins on the app's homepage and full navigation is continued both along and cross-page. The data collection was performed from January to March of 2021 by the authors of this paper. We note the importance of defining quality criteria in the information and communication of regional press via smartphones so that they can serve as good sources of information for local journalists.

Table 2. What tools are provided for the participation of local citizens to contribute to produce local news content?

General Indicators of Evaluation		Theoretical Framework
4	Uses tasks to get readers to contribute with local news content according to your location.	[26]
5	Produces guest posts on local topics and immigrant issues.	[26]
6	Gallery for sends local videos or photos via geo-tagging systems.	[26]
7	Use spaces for interacting between users from the same location.	[26]
8	If there is advertising, the advertising content is location-based.	[34,37]
9	Provides interaction with local users through social media.	[32]
10	User service with the contacts of the editors or those responsible for the apps.	[33]

Indicators for the analysis of the Portuguese local press apps.

For the sake of ease and clarity, the indicators are designed in such a way that the answers are positive when the information is available and negative when the information is not present, incomplete, or inadequate. With regard to the validation of the indicators, both the indicators and the way in which they are evaluated allow for transparency and verification. We opted for this methodological option as these indicators provide an easy and fast tool for evaluation. In the context of Portuguese local journalism, where journalists are sometimes amateurs, it appears as a reasonable alternative to, for instance, Likert-type or open questions that imply a higher volume of information that convolute the analysis.

3.2. Portuguese Mobile Applications

These five applications belong to the local newspapers that in Portugal have been working with mobile apps for the longest time and were selected because they stand out, presenting more updated news and faster growth in the number of visits than other local presses [41–43] (see Table 3, below).

Table 3. Some data of the Portuguese local press apps evaluated.

	Head Office	Growth of Subscribers 2019 to 2020	Growth in Number of Visits from 2019 to 2020
<i>Repórter no Mundo</i>	Leiria	3.8 K	-
	-	-	32%
<i>Diário do Minho Açoriano Oriental</i>	Braga	1.3 K	25%
	São Miguel-Azores	2 K	27%
<i>Dnoticias</i>	-	4.9 K	53%
	Madeira	-	-
<i>Diário de Coimbra</i>	Coimbra	3.1 K	33%

Before the evaluation of the applications, we first briefly describe their main features and history.

- *Repórter no Mundo*: This app was created in July of 2018 by the *Região de Leiria* newspaper. This newspaper was founded by José Batista dos Santos in the 1930s as a family project. The app *Repórter no Mundo* stands out as one of the most representative mobile applications in the central region of Portugal. This app was created by the newspaper in collaboration with the Polytechnic Institute of Leiria and was the first-ever local media receiving financial support from the Google Digital News Initiative in Portugal. The application was created as a means of promoting the local economy and cultural ties, as well as enhancing the relationship between citizens of the Leiria region who are abroad and those who are in Portugal. For instance, the location of the news generated by users of *Repórter no Mundo* coming from Portugal only represented 58.9%; the remaining came from countries with a dense Portuguese immigrant community, such as Angola (7%) or France (6.4%) [40].
- *Diário do Minho*: Based in Braga and founded in 1919, it is a daily information newspaper focused on the Minho region. Its mobile app was launched in 2018 and it is one of

the most representative in northern Portugal. According to the survey conducted by Bareme Imprensa Regional [41], the average audience reaches 70,000 daily readers.

- *Açoriano Oriental*: Founded in 1835, it is the oldest daily Portuguese newspaper and one of the ten oldest in the world that has continuously been published with a daily frequency. The journal is focused on regional information from the archipelago of the Azores and combines public service and community aspects with politics and journalism. The application was created in 2017.
- *Dnotícias*: Founded in 1876, the *Diário de Notícias da Madeira* is a centenary daily newspaper from the Madeira archipelago, with an average circulation of 10,854 copies and having around 5600 subscribers [41], the largest in Portugal. Its app was created in 2016, the date of the newspaper's 140th anniversary.
- *Diário de Coimbra*: Founded in 1930, it is one of the oldest newspapers in Europe and the leader in the Coimbra region. It belongs to a group that contains three more local daily newspapers that cover the central region of Portugal. The app was created in 2020.

4. Results and Discussion

The results show that none of the applications have even met half of the criteria proposed in this study. The applications that performed better in the analysis were *Repórter no Mundo* and *Dnotícias*, gathering three positive criteria for each one. According to the results presented in Table 4 (below), no platform complies with the first four analysis criteria.

Table 4. The criteria met in the applications considered in this study.

	<i>Repórter no Mundo</i>	<i>Diário do Minho</i>	<i>Açoriano Oriental</i>	<i>Dnotícias</i>	<i>Diário de Coimbra</i>
1. Offers options to receive local information, such as here, nearby, or anywhere.	-	-	-	-	-
2. Proximity news alerts	-	-	-	-	-
3. Visualization tools, such as online mapping	-	-	-	-	-
4. Tasks of local news	-	-	-	-	-
5. Guest posts of local news	✓	-	-	-	-
6. Gallery for send videos or photos	-	-	-	-	-
7. Spaces for interaction between users from the same location	✓	-	-	-	-
8. Location-based advertising	-	✓	-	✓	-
9. Social Media	✓	✓	✓	✓	✓
10. Support for users	-	-	-	✓	-

Only indicator 14 (Social media) was satisfied by all the apps. The app *Repórter no Mundo* provides incentives for users' participation, giving different levels of titles to users, such as "correspondents" or "senior correspondents", according to the number of news published. Next, we provide a more detailed analysis of the indicators considered in this work for each app.

Regarding the news, the apps failed to comply with indicators 1, 2 and 3. There are no options to receive local news, like "here", "nearby" or "elsewhere" (indicator 1), alerts to users about news near them (indicator 2), news edition features like online maps (indicator 3). Therefore, even though geolocation technologies are a key element to explore new possibilities to provide content based on proximity, these tools are little explored [20,33].

We noted that the applications analyzed do not provide geolocation features to encourage public engagement, failing to meet criteria for indicators 4, 5 and 6. Resources, such as the ones described in indicator 4 or guest posts in indicator 5 are not available to foster content creation in the local news context. Although the *Diário do Minho* app has

a gallery with photos and videos, these cannot be uploaded with geotags, thus failing to meet the criteria for indicator 6 (Figure 1).



Figure 1. Video or photo galleries of the app *Diário do Minho* without geo-tagging system.

The *Repórter no Mundo* app was the only application that uses guest posts and spaces for interaction among registered users in the same location, as described in indicators 5 and 7. This application's menu features a section called "Community" in which the newspaper editors propose 7 guest posts. These posts address topics related to Portuguese immigrants and the local community. Users are invited to cover information on the topic in question, give their opinion, write news and interact with users registered on the platform. During our analysis, we observed that the application provides a specific incentive for public participation: recognition. In this way, the reader who frequently produces news publications will receive the title of "correspondent". Thus, according to the number of news published, users will be able to further improve their title, which ranges from "candidate to correspondent" to "senior correspondent" (Figure 2).

Regarding indicator 8, we noted that the *Diário do Minho* and *Dnoticias* applications do display advertising based on the user's location. Despite little investment in resources regarding the participation and interaction of users in the assessed applications, all of them use social media to share content, thus gathering a positive evaluation for indicator 9. Although the use of social media facilitates the sharing of content [32], the lack of environments developed exclusively for public interaction and participation in the evaluated apps, except for the *Reporter no Mundo* app, represents an important flaw.

Lastly, for the user's support (indicator 10), we noticed that there is little effort to provide this type of resource in the assessed applications. Only the *Açoriano Oriental* app has a visible area with contact information for the app's editors with phone numbers, e-mail addresses and technical support. Issues arising from registration or when uploading photos or videos frequently occur, and it is important to provide a technical support area to help less experienced users.

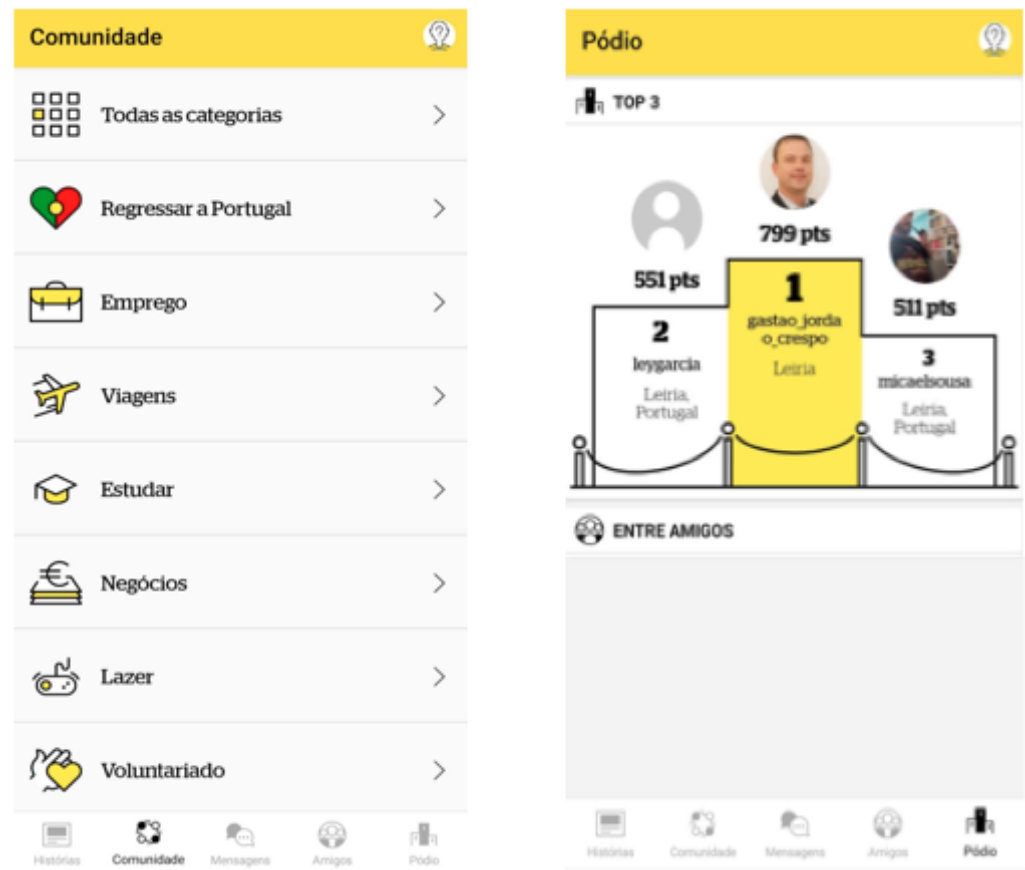


Figure 2. Guests' posts and spaces to foster public participation in the app *Repórter no Mundo*.

5. Conclusions

Regarding the analysis of the situation of Portuguese journalism with respect to the use of apps (objective 1), a conclusion derived from this work is that services provided by geolocation technology could be an interesting technology for Portuguese local media, and it is up to the media to develop suitable mobile apps to achieve this. To this end, this paper provides new knowledge, which will help in the inevitable transition of the local press sector to a more digital environment. Despite the decline of Portuguese local newspapers, if we contrast the recent advances with the situation in the last decade, today's initiatives towards digitalization bring new opportunities to further advance the development of more appealing products for local journalism that can help to overcome its economic and social struggles.

In this paper, we have reviewed the current situation of the local press in Portugal, and we have analyzed the theoretical framework to present a novel assessment tool based on the definition of 10 indicators. This provides us with an effective guideline that allows us to assess the use of mobile apps by local journalism, regarding digital resources that delve into location information. In this way, we reached the second objective established for this work, presenting a methodology that allows local journalists to improve geolocation resources following the criteria used to validate each indicator.

Regarding the third and last objective, we assessed, based on the established guidelines, some of the most significant mobile apps of the local press in Portugal. Our analysis shows that even though geolocation services represent an opportunity for Portuguese local media, we still find shortcomings in their use. The causes for this can be due to the relatively recent transition of the Portuguese local newspapers to digital platforms. The digitalization of the sector has not sufficiently matured yet in many aspects and this led to poor implementation of new and optimized applications. This can be attributed to several factors, such as the decrease of state support to the local press, the lack of strategy

from local media companies—most often it is the initiative of local journalists that stands out—and the low use of digital tools in less populated areas of Portugal.

The poor results obtained by the Portuguese apps analyzed in this work also show that some of the indicators proposed, fail to properly illustrate the current state of the development of Portuguese apps for local journalism. Although we expect that some of these apps will obtain better results in the near future, once the sector is consolidated, the set of indicators designed may be revised to more accurately assess early developments in the young sector of Portuguese apps for local journalism. For further studies, some possible adaptations include loosening some of the indicators or allowing more answer options, thus refining the data results.

This study focused primarily on the analysis of the tools offered by geolocation technology for public engagement and participation, but we note that some other desirable aspects must also be considered. For instance, due to the crucial social role played by the local press in Portugal, it is important to consider also accessibility issues when designing this type of mobile apps. It would be also interesting to collect more data directly from the local press in order to investigate the further possible improvements to the implementation of apps of local newspapers.

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