Mobile applications for cultural tourism. St. James Way

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Abstract

This article presents the result of the study on mobile applications (apps) in the area of Cultural Tourism for the St. James Way. This study was developed within the scope of activity B2 "Content management belonging to the national cultural heritage based on open systems of preservation and interaction" of the CHIC project – "Cooperative Holistic View on Internet and Content" (POCI-01-0247-FEDER-024498). Activity B2 aims to design and implement a platform for the development of mobile applications, which supports advanced media contents such as augmented reality, 360° video and georeferenced data, with the development of an application for the St. James Way. In this article, the main characteristics of existing mobile applications for the St. James Way are presented and analyzed.

Keywords

mobile apps; St. James Way; CHIC; augmented reality; cultural tourism

Aplicações móveis para o turismo cultural: Caminhos de Santiago

Resumo

Este artigo apresenta o resultado do estudo sobre as aplicações móveis na área do Turismo Cultural para os Caminhos de Santiago. Este estudo foi desenvolvido no âmbito da atividade B2 "Gestão de conteúdos pertencentes ao património cultural nacional baseado em sistemas abertos de preservação e interação" do projeto CHIC – "Cooperative Holistic View on Internet and Content" (POCI-01-0247-FEDER-024498). A atividade B2 tem como objetivo conceber e implementar uma plataforma para o desenvolvimento de aplicações móveis, que suporte conteúdos de média avançados como realidade aumentada, vídeo 360° e dados georreferenciados, tendo sido selecionada como prova de conceito o desenvolvimento de uma aplicação para os Caminhos de Santiago. Neste artigo são apresentadas e analisadas as principais caraterísticas das aplicações móveis existentes para os Caminhos de Santiago.

Palavras-chave

aplicações móveis; Caminhos de Santiago; CHIC; realidade aumentada; turismo cultural

Revista Lusófona de Estudos Culturais / Lusophone Journal of Cultural Studies, vol. 7, n. 1, 2020

Mobile applications for cultural tourism. St. James Way · Miguel Mazeda & Luís Teixeira

Introduction

Agência Nacional de Inovação (ANI) (Portuguese Innovation Agency), aims to promote actions to support technological and business innovation in Portugal, contributing to strengthen the Portuguese Innovation System (SNI) and to strengthen the competitiveness of the national economy in global markets. One of the actions that ANI promotes is the mobilizing programs: strategic research and development projects that aim to create new products, processes or services (PPS) with high technological and innovation content.

The mobilizing project CHIC – "Cooperative Holistic View on Internet and Content" (POCI-01-0247-FEDER-024498), aims to create a series of services and platforms necessary to provide for the production and distribution of new forms of content consumption, in order to promote the quality of services and consumer experience. It is structured according to several PPS that integrate open platforms for managing the production and distribution of digital content in the cloud and the management of content belonging to national cultural heritage based on open systems of preservation and interaction. This is namely done through PTAPNC (Technological platform to support the National Cinema Plan), NVDCTP (New Content Dissemination Platforms in the area of Tourism and Heritage) and ILN (Interfaces in natural language for online navigation and cable distribution systems).

B2 activity for the CHIC project aims to develop a content dissemination platform in the area of Tourism and Heritage, integrating journalistic resources that allow users to discover cultural and historical heritage through a mobile application. The application will support and provide different types of content, from contextualized (text) articles to augmented reality, virtual reality and mixed reality experiences[1].

This study was carried out in the initial phase of the project in order to support the definition of requirements and functions of the platform to be developed.

Mobile applications: new touristic tools

The rapid growth in the use of smartphones and their mobile applications has created new ways for the tourism industry to connect with its visitors as they travel. Smartphones were quickly adopted as tourist travel tools (Dickinson et al., 2014). The development of technologies has become inherent in the growth of tourism, as it is a resource that contributes to the promotion of destinations, as well as to obtain information from tourists. In this process of innovation, technologies allow for the entire course of a journey to be flexible, with the necessary means to plan the journey, as well as to adapt it to the circumstances (Oh, Letho & Park, 2009). A journey is supported by a wide variety of technological tools across different platforms, accessible at different locations and dates (Lamsfus, Wang, Alzua-Sorzabal & Xiang, 2015; Miller, 2012).

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[1] Sometimes referred to as hybrid or mixed reality. It is a combination of real and virtual world, in order to produce new environments and visualizations, in which physical and digital objects coexist and interact with each other.

Revista Lusófona de Estudos Culturais / Lusophone Journal of Cultural Studies, vol. 7, n. 1, 2020

Mobile applications for cultural tourism. St. James Way · Miguel Mazeda & Luís Teixeira

The applications provide results to users through a set of variable parameters defined by the user and their context. For example, the results of a Google search for restaurants by a Dutch user will be different when planning a journey when you are in the Netherlands or when visiting another country like Portugal. Although previous queries are stored, Google will detect the current location and update suggestions for keywords. The exponential growth of solutions for digital environments makes tasks like searching and selecting information heavy. Recommendation systems[2] allow the reduction of this information overload and offer recommendations based on the users' profiles and habits.

The recommendation systems available in e-tourism acquire the users' needs / desires explicitly or implicitly, as we are facing an environment conducive to extracting our activity (Gavalas, Konstantopoulos, Mastakas & Pantziou, 2014). Thus, they suggest destinations to visit, points of interest through user searches, even presenting discounts or tour packages that match the search history. The purpose of these systems is to facilitate the users' research and at the same time persuade them to purchase the proposed services.

The mobile application market is constantly expanding, as we can see from the consumption of smartphones and the news published by the media. According to Dias (2018), in 2018, worldwide, in 2017, the number of downloads was about 175 billion and spending on apps was worth 70 billion euros. These figures represent a growth of 60% and 105%, respectively, compared to 2015 (App Annie, 2018). As far as tourism is concerned, we have witnessed a significant growth in Portugal due to a change in the paradigm of tourism offer, and this phenomenon is not due to any cyclical reason (Costa, 2017).

In the tourism area there is an active participation of municipalities in the development of applications that promote cities. It is natural that in a world where a large part of the population uses smartphones (five billion people[3]) there is a preference for mobile applications that facilitate access to information and make life simpler, more comfortable and practical. When traveling, this is of constant interest, especially due to georeferenced applications that provide information about maps, guides, services, points of interest, events, among others.

In Portugal, this investment is visible and several municipalities have launched mobile applications that have served to facilitate the mobility of visitors in their cities. Guimarães is one of the examples when it launched the Guimarães Mobitur application, in 2012, to welcome the European Capital of Culture 2012.

At the same time, and increasingly, municipalities have invested in such platforms to improve visitor experience, to provide new ways of attracting tourists, to make information easily available, to reinforce the visibility of the local brand, and to facilitate

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[2] TripAdvisor and Zoomato are two websites/mobile applications that work as popular recommendation systems in the area of tourism.

[3] Retrieved from http://www.gsma.com/newsroom/press-release/number-mobile-subscribers-worldwide-hits-5-billion/

Revista Lusófona de Estudos Culturais / Lusophone Journal of Cultural Studies, vol. 7, n. 1, 2020

Mobile applications for cultural tourism. St. James Way · Miguel Mazeda & Luís Teixeira

access to products and services of local entities. This, in turn, boosts higher revenues and provides a platform that allows direct and faster feedback from visitors. In the hyper-competitive world in which we live, it is important not to lag behind the competition, by offering attractive products, but also functional items and emotional appeals.

The use of mobile applications on pilgrimage to Santiago de Compostela

Over the last few decades, tourism has started to be part of any individual's life, whatever its differences, with various positive effects (Glaesser, 2006). Thus, the tourism industry has positioned itself in leadership positions as a relevant economic activity at a global level. Following Unesco's requirements for cultural heritage, Portugal has established a program to increase tourism projects, with the aim of enhancing not only monuments, but also the communities where they are located (Lopes, 2000). Tourism has grown without almost any interruption over time, currently representing 7% of world exports of goods and services (World Tourism Organization [UNWTO], 2017).

Cultural and religious tourism is significantly positioned as part of the economy of this sector, mainly in cities and places with a relevant presence of civil and religious heritage, as well as manifestations of various beliefs and their religious practices.

Culture's main motivation is knowledge and the existence of some sort of appreciation. Its concept is essential in several academic areas, but it has always been difficult to define it. In its etymological origin, there are two different derivations. *Colere* means to cultivate in the sense of cultivating a field, which implies change and transformation, processes of soil fertilization and growth (Pires, 2006). *Cultus* means to adore, to worship in the sense of developing a certain religious feeling, which also implies a change – inside each individual (Pires, 2006). Thus, an inherent link between culture and religious practices is perceivable.

Over the years, the concept of culture has evolved and several definitions have been attributed to this concept. In general, culture refers to a set of processes and patterns learned from human behavior, such as language, religion, customs and conventions. In a way, culture is a reflection of a society's spiritual, intellectual and aesthetic development, as well as its way of life (Pires, 2006). It can be said that it is indicative of progress.

Cultural and religious heritage unites beliefs with cultural values, crossing strong architectural and visual aspects with spiritual reasons. Thus, cultural and religious tourism has become relevant and has presented strong motivations for traveling (Antunes, 2016). While the cultural and religious heritage is in a prominent position, the Ministry of Economy and Employment integrates the historical, cultural, religious and landscape heritage in the national strategic plan for tourism as was presented in 2012. One of the essential values of the brand "Destino Portugal" ("Destination: Portugal") is based on history, culture and tradition. There is a need to reinforce tourist circuits that highlight the diversity of cultural, religious and natural heritage (Plano Estratégico Nacional de Turismo [PENT], 2012).

Revista Lusófona de Estudos Culturais / Lusophone Journal of Cultural Studies, vol. 7, n. 1, 2020

Mobile applications for cultural tourism. St. James Way · Miguel Mazeda & Luís Teixeira

Religious tourism, and the constant commitment to it, is visible all over the world. The richest regions in historical, religious and cultural resources have used this in favor of their strategic plans. For example, religious tourism is the second largest industry in Saudi Arabia since the beginning of the 21st century and has always generated annual revenues of eight billion and growing at a faster rate than any other sector (Paul & Mourad, 2017). Governments when taking measures to include places and monuments on the world heritage list receive direct benefits (financial and technical) from Unesco, but also achieve prestige and international projection (Lopes, 2000). It is easy to understand that the exponential increase in this practice exposes museums and monuments to great wear and tear as well as to trivialization. However, despite this negative burden, but normal given the flow of tourism and the growing interest, which requires restricted access and awareness in relation to respect and understanding, there are benefits such as favoring respect between cultures, the creation of communities as well as economic value.

Given the growth in tourism, the concern of cities and countries is also growing. This concern is mainly to make life easier for those who visit them, contributing to a better experience and complementing it with a digital presence given the era in which we live.

Within the scope of the pilgrimage, more specifically on the St. James' Way, several mobile applications have been developed in order to facilitate the journey of pilgrims as well as to complete the pilgrimage through the development of digital content.

During the pilgrimage to Santiago de Compostela, pilgrims can enjoy the natural and cultural landscape of The Way. However, in addition to contemplation, we are facing the growth and introduction of digital media in these practices of medieval origin.

We live in an era where more and more help from mobile technology to plan a journey or to get the most out of it is emerging. When looking at the highly technological society in which pilgrims are integrated, it is important to understand the technological use during the pilgrimage as well as the intention to use it while traveling (Antunes, 2016).

How does the relationship between a pilgrim and the use of a mobile application during their journey differ from that of a tourist and the use of an app while traveling? The motivations of a pilgrim and of a tourist are different. To develop a mobile application that has some value for pilgrims, it is crucial to understand the context of a pilgrimage and understand the specifics of the pilgrimage path. Despite the differences before starting a journey, there are several features in mobile applications for tourists that can be useful for pilgrims, such as information about where they are, nearby monuments and places of interest, as well as places to stay and other information that provides safety and comfort.

These days, people usually have more than one reason to travel (Drule, Chiş, Băcilă & Ciornea, 2012). Relevant literature defines two categories as a way of framing the motivations for tourism. *Push factors* are internal stimuli that induce people to travel and fulfill their needs in this way, while *pull factors* are external factors especially related to the attributes and attractiveness of the destination (Crompton & McKay, 1997; Drule, Chiş,

Revista Lusófona de Estudos Culturais / Lusophone Journal of Cultural Studies, vol. 7, n. 1, 2020

Mobile applications for cultural tourism. St. James Way · Miguel Mazeda & Luís Teixeira

Băcilă & Ciornea, 2012; Kim, ChoongKi & Klenosky, 2003; Morgan, 2006; Yoon & Uysal, 2005). These categories are related and evolve to adapt to the situation. Likewise, tourist motivation is a complex concept that depends on each individual and has a significant influence on the decision-making process (Correia & Crouch, 2004).

In a recent study, carried out with 222 Portuguese pilgrims, it was found that one of the most important aspects of a mobile application on St. James' Way is its usefulness (Antunes & Amaro, 2016). It is crucial that it presents relevant information about the path based on the pilgrim's location through an easy-to-use interface. There was a great interest in sharing information and experiences among pilgrims during the journey. In the development of an app for this market, it is therefore important to implement a mechanism that allows such content sharing.

The use of technology during the pilgrimage is completely voluntary. Some pilgrims prefer to break free from technology and get closer to nature as well as pay attention to the spiritual causes that move them on this journey (Nickerson, Austreich & Eng, 2014). However, the existence of a mobile application with useful information about St. James' Way promotes the intention to use it (Antunes, 2016).

In medieval times, the guide used to travel St. James' Way was the *Codex Calixtinus*, written in Latin between 1130 and 1160. It was considered the first guide of The Way. Nowadays, pilgrims take with them several support guides in different languages (Antunes, 2016). The official page to support the Pilgrim (Oficina do Peregrino) is also available to pilgrims. This provides various information, namely the times for religious activities.

The increasing use of technological solutions in St. James' Way is due to it becoming a tourist route, and the use of GPS and sharing of itineraries and photographs by pilgrims.

Survey of available apps in online stores

There are several applications for St. James' Way and a remarkable redundancy in the functionalities they offer. There is a vast offer, mainly for the Android operating system (OS). Some apps support both operating systems.

More than 50 applications have been identified for St. James' Way. Information was collected for each app, such as: name of the app, developer, operating system, type of application and availability.[4] The selection of these attributes was based on studies, articles, analysis of questionnaires carried out on to pilgrims and surveys in the stores on this subject. From this list, we have tried to analyze which are the most relevant applications available in stores (App Store and Play Store) and their functionalities.

Thus, two tables were developed (see Appendix) with information such as application availability in stores, predominant type of application (online, offline, synchronization),

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[4] Some of the listed applications have been taken from other studies previously carried out and are therefore no longer available. Also referred to as unavailable are those apps that cannot be accessed in Portuguese stores.

Revista Lusófona de Estudos Culturais / Lusophone Journal of Cultural Studies, vol. 7, n. 1, 2020

Mobile applications for cultural tourism. St. James Way · Miguel Mazeda & Luís Teixeira

which includes the existence of 21 iOS apps (one unavailable) and 50 apps for Android (23 unavailable).

In general, mobile applications on the pilgrimage to Santiago de Compostela can be grouped into several categories according to the type of service they offer:

- general information;

- news and current information;

- accommodation;

- cultural heritage and touristic sites;

- games, travel diary and books;

- communication;

- weather and forecast;

- health;

- interactivity (augmented reality).

Most applications on the market are completely free, with the exception of a few that offer paid products. However, prices are not high, and the available items in these applications can cost between 0,79-5,90€.

The only app that deviates from this is the "Camino Pilgrim - Frances" which allows donations between 2,50-100€, but whose installation and use are free. These applications do not have any visible advertising section.

According to the survey, the first analysis was the type of application used in this context. The online type is predominant and this is due to geo-referencing. That is, the app has real-time information about the geographic position of the mobile device user, which allows applications to provide updated and relevant information considering its coordinates.

We live in a technological age in which the available technologies have interesting solutions for presenting information in various ways. Despite these facilities, there are still not many applications on St. James' Way capable of making pilgrims enjoy the journey in the digital world and that this world can be part of their journey. The various mobile applications on St. James' Way in the market focus on the functionality and utility of the information they provide to their users. Such apps intend to make the pilgrims aware of aspects that they consider important during the journey, such as:

- specific information for pilgrims who travel St. James' Way on foot or by bicycle;

- pilgrim's position on the map;

- stages planner to organize the route individually;

- geo-localized information points about different types of accommodation, points of interest and important notices;

- real-time weather information and information on locations and available services;

- sharing the exact location with friends;

- access to different itineraries.

Revista Lusófona de Estudos Culturais / Lusophone Journal of Cultural Studies, vol. 7, n. 1, 2020

Mobile applications for cultural tourism. St. James Way · Miguel Mazeda & Luís Teixeira

After identifying the available apps in online stores (tables in appendix) for St. James' Way, we decided to focus the study on a smaller group of apps, but that was representative of the existing offer. The following criteria were used:

- user ratings by users / number of comments;

- surveys carried out in studies;

- pilgrims' knowledge of existing apps;

- selecting an app when the same developer makes several apps available for different paths;

- use of only one of the applications existing in stores (App Store and Play Store).

Name	Developer	Operating System	Rating	Number of reviews
Guide of the Way of St James	Buen Camino	iOS	4.3	10
Camino (Eroski Consumer)	BIKO	iOS	N/A	N/A
A Wise Pilgrim Guide (Várias)	Wise Pilgrim	iOS	N/A	N/A
Augmented Reality St James Way	Ricardo Meana	Android	3.7	33
Buen Camino	Chaligne Aurore	Android	3.8	26
Caminho de Santiago Pro	Editorial Buen Camino	Android	4.3	1204
Caminho de Santiago 360º	IRALTA FILMS, S.L.	Android	4.4	60
Cno. Santiago	CNIG	Android	4.2	43
Camino de Santiago	COTESA	Android	4.2	5
Camino de Santiago Guide	CaminoGuide.net	Android	4.9	17
Camino de Santiago Guide v2.0	Tournride.com	Android	3.3	131
Camino Francés – Wise Pilgrim	Wise Pilgrim	Android	3.1	31
Camino Pilgrim - Francés	Aurea Moemke	Android	4.8	1392
Caminos de Santiago (Várias)	IndependenTrip	Android	N/A	N/A
Caminos de Santiago Eroski	Eroski Consumer	Android	3.7	84
eCamino	eCamino Kft	Android	3.3	26
miCamino	micaminodesantiago.com	Android	4.3	1291
The Way of Saint James	SEGITTUR	Android	4.1	19

Table 1: List of relevant mobile applications on St. James' Way for iOS and Android

Using the defined criteria, 18 applications were selected (Table 1)[5]. Some applications offer media content such as augmented reality and 360º photographs. The "Augmented reality St James Way" application uses augmented reality in geo-localized points to provide information about accommodation and points of interest. In this case, the information is available in a traditional manner without taking advantage of the immersive potential of this technology. When analyzing the functionality of the 18 apps, we observed that functionalities in more than 80% of apps are:

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[5] Some iOS applications do not have a rating. The store only provides data based on a number of reviews. The ratings are on a numerical scale from 0 to 5.

Revista Lusófona de Estudos Culturais / Lusophone Journal of Cultural Studies, vol. 7, n. 1, 2020

Mobile applications for cultural tourism. St. James Way · Miguel Mazeda & Luís Teixeira

- information about points of interest;
- accommodation directory;
- directory of locations / services;
- walking routes / itineraries;
- distances / altitudes;
- GPS.

We also observed that functionalities in more than 10% and less than 50% of apps are:

- guidelines / advice (advice to prepare the walk as best as possible);
- information about the Way;
- meteorology;
- multilingual;
- review / comments;
- bicycle routes / itineraries;
- customized planner / schedule;
- offline maps (download availability);
- sharing / sending social networks;
- sharing notes / photos;
- sharing / sending location;
- flashlight.

The functionalities in only one app in each OS are:

- real-time alerts;
- diary (possibility of creating a pilgrimage diary / insertion of text and visual elements in each stage of the pilgrimage);
- augmented reality information;
- user profile (creating a profile with personal information that allows you to interact with other pilgrims);
- virtual interactive guide (traveling the Way virtually by using interactive guides).

Some of the selected mobile applications were tested for usability. The usability of a mobile application refers to the ease of access or effort that leads a user to reach their goal. The usability test is a procedure for checking the functionality of the interface of a digital platform, in this case an app. After its execution, an analysis of usability and of the main difficulties has been carried out.

Programmers should pay attention to some aspects in the production of an application, such as how it works on different operating systems and devices. In any type of software, usability is a concept that considers three fundamental aspects: efficiency, learning and satisfaction (Nayebi, Desharnais & Abran, 2012). Thus, when evaluating the usability of an application we need to consider the time it takes to complete a certain task, learning the operations through observing the object and the fact that it meets the expectations of users.

Revista Lusófona de Estudos Culturais / Lusophone Journal of Cultural Studies, vol. 7, n. 1, 2020

Mobile applications for cultural tourism. St. James Way · Miguel Mazeda & Luís Teixeira

The "Caminho de Santiago Pro" mobile application was developed from the guides of St. James' Way by the renowned pilgrim and journalist Carlos Mencos (winner of the "Aymeric Picaud 2015" award for the promotion of St. James' Way), which has already led tens of thousands of pilgrims to Santiago[6]. The guides have been adapted to be incorporated into the application and have become more complete than the book itself. The application offers, by default, the guide to the Baztán route. The other routes can be purchased for a lower price than the book format. This app provides a high volume of data. However it can be confusing at first, due to the multiple windows that have to be opened by the user as well as the layout of the buttons and contents. Access to information is not easy and the user must perform several actions to gain access to the information.

The smaller the number of steps the user has to perform, the less effort the user will have to achieve their goals and obtain the information they are looking for. The information is available on long pages, which makes it difficult to understand the content and delays actions in the app. The application that aims to serve the pilgrim and make their journey easier becomes a more complex process than initially expected. However, it presents several factors that contribute to its success, such as the large number of navigation options as well as the inclusion of the guides of the renowned Carlos Mencos, the credibility of the information and the immediate support given by the developers. The application currently has 1259 reviews totaling a rating of 4.3 / 5[7].

Another application selected to be tested was the "Caminho de Santiago 360°" app, the winning application of the "The App Tourism Awards 2016", organized by FITUR[8] in the "Destination Guide" category. This application works as a virtual interactive guide that allows the user to walk the path virtually, accessing information about points of interest, as well as the possibility to visit the monuments through photographs and 360° videos that place the user on the spot. On this interactive journey, the user is accompanied by Margaret, a New Yorker passionate for art and architecture, and António, a friendly Spaniard who likes to try the local cuisine, as well as other characters. This application developed by IRALTA FILMS S. L.[9] has 60 reviews on the Play Store and a final rating of 4.4 / 5.[10] In the free version, only the first stage is available: the Roncesvalles itinerary to Pamplona. The other nine chapters can be purchased individually for 1.00€ or you can purchase all the chapters for 2.09€. The application is well structured with an updated design and easy access to the selected information. The app has the explicit objective of taking the Way to the user. The layout of the content allows a comfortable and

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[6] Retrieved from http://periodistascompostela.gal/index.php/eventos/24-carlos-mencos-galardonado-premio-aymeric-picaud

[7] Retrieved from http://play.google.com/store?hl=pt_PT

[8] The International Tourism Fair is held in Madrid and is the global meeting point for tourism professionals and the main fair for receptive and emitting markets in Latin America. Retrieved from http://www.ifema.es/fitur_01/

[9] Audiovisual producer with a focus on immersive experiences and a passion for virtual reality based in Madrid, Spain. Retrieved from http://iraltavr.es

[10] Retrieved from http://play.google.com/store?hl=pt_PT

Revista Lusófona de Estudos Culturais / Lusophone Journal of Cultural Studies, vol. 7, n. 1, 2020

Mobile applications for cultural tourism. St. James Way · Miguel Mazeda & Luís Teixeira

intuitive navigation. In the first chapter, analyzing the user interaction with the available data and the duration of the 360° video, the itinerary can be done in the app in a time interval of between 10 to 15 minutes. For the 10 existing chapters, the interval value should vary between 100 to 150 minutes of interactivity in the application.

There are other applications that were not included in the study due to their reduced expression in the market at the time of this study, but that reveal some potential. Examples of this are two applications launched by municipalities and that serve to enhance their strategies. Municipalities play an important role in the development of these projects, as they increase the digital presence of cities and boost the growth of tourism.

The Junta de Galicia developed the mobile application "Camiño de Santiago en Galicia", for Android and iOS, within the "Smart Camiño" project. It is a pilgrim-oriented app for their journey. This project is included in the "Plano Smart Turismo", within the "Plan Integral de Turismo", and has an expected investment of 10 million euros until 2020 (Xunta de Galicia, 2014). The Junta de Galicia, through the Galicia Tourism Agency, developed the "Comprehensive Tourism Plan of Galicia" that aims to give sustainability to the tourism sector, adapting business models and tourism management policies. The "Plano Smart Turismo" appears in order to boost the sector's modernization and competitiveness through ICT. These plans are in line with the "Strategic Plan for Galicia" and Europe 2020 Strategy, as well as the preparatory documents for the "Estrategia de Especialización Inteligente Gallega" (RIS3) [11], a future plan to generate well-being, sustainable jobs and compete abroad. This investment is also a form of tourist attraction and a cultural offer strategy, knowing that the year 2021 is a Jacobean year [12] or a holy year in Compostela. Such years attract many believers to seek absolution from all their sins.

The application provides information on all the St. James' Way routes after entering Galicia, as well as the official network of hostels with all the characteristics, services and contacts, events, tourist resources, alerts for offers published by tourist establishments, weather conditions provided by MeteoGalicia [13] and contact details and addresses. This is an example where the costs of the application are borne by the municipality, and the application is part of its strategy.

In the same way, the "Valorização dos Caminhos de Santiago - Caminho Português da Costa" ("Valuation of the St. James' Ways – Portuguese Coastal Way") results from a joint application of the 10 municipalities included in the route, to Norte 2020 (the funding EU program) with the aim of giving value to and officially recognizing this Way as a pilgrimage itinerary to Santiago [14].

[11] Retrieved from http://www.ris3galicia.es

[12] These years happen when the July 25, the festivity celebrating the martyrdom of St. James, coincides with a Sunday. With an interval of 6, 5, 6 and 11 years, the 25th of July takes place on a Sunday.

[13] Galician regional weather agency, Spain.

[14] According to some historians, this Way was one of the most important axes to reach the house of the disciple in Santiago de Compostela. This Way starts in Porto goes through Matosinhos, Maia, Vila do Conde, Póvoa de Varzim, Esposende, Viana do Castelo, Caminha, Vila Nova de Cerveira and Valença, and is duly noted 15th century onwards. Retrieved from http://www.caminhoportuguesdacosta.com/pt

Revista Lusófona de Estudos Culturais / Lusophone Journal of Cultural Studies, vol. 7, n. 1, 2020

Mobile applications for cultural tourism. St. James Way · Miguel Mazeda & Luís Teixeira

The mobile application "Caminhos de Santiago - Caminho Português da Costa" has been developed by Sétima Lda[15], and it is promoted by the municipalities in the itinerary and financed by Norte 2020 program. The application aims to serve as an interactive guide during the pilgrim's walk, allows them to download the route created on the web platform with all points of interest to visit and to create a digital credential. It is a useful application also prior to the journey, due to the list of tips in the app with reference to clothing, accessories, shoes, backpack, breaks, walking techniques, food and hydration, foot care, injuries, fatigue and accommodation.

The particularity of the digital credential is curious, as it works as a user profile that allows them to register the pilgrim's footprint by submitting content that can be revisited later.

This application allows the viewing and sharing of user statements, which promotes dialogue on the Portuguese Coastal Way, the sharing of experiences and making new pilgrims aware of the most positive points as well as the negative points of this itinerary. Currently, the application has 20 statements which demonstrates its underuse.

Despite the few downloads, users have high levels of satisfaction with its performance, a fact that is patent in the 17 reviews of the Play Store that represent 4.8 / 5 in the rating of this app.

This application is also available for the iOS system, but the store's rating system is more rigorous and it is only presented based on a number of reviews. However, it is possible to see that two reviews were offered, both rated 5/5, with reference to the utility of the application before and during the pilgrimage[16].

It is a high performance application and responds quickly in the execution of tasks. It is well-structured in terms of design and functionality, as well as in terms of information made available to the user. It displays only the essential information with a navigation that is conducive to the completion of tasks, without an exaggerated number of steps or an excessive number of open windows. The information is clearly arranged and concise, which reduces the need to zoom or navigte on the platform.

In addition to mobile applications, there are other types of digital platforms that have already been created as part of the pilgrimage. The National Civil Protection Authority (ANPC) created a digital platform to support pilgrims who traveled to Fátima on foot. It was launched as part of "Operação Fátima 2017" ("Operation Fátima 2017") for the Pope's visit to Fátima that took place in May of that year[17].

This platform gathers useful information to support the pilgrim to Fátima and a geo-referencing tool in which

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[15] Technological company that develops web and mobile solutions, based in Braga. Retrieved from http://www.setima.pt

[16] Retrieved from the Play Store and App Store websites, at http://play.google.com/store?hl=pt_PT and http://www.apple.com/pt/ios/app-store/

[17] Retrieved from http://www.protecaocivilfatima.pt

Revista Lusófona de Estudos Culturais / Lusophone Journal of Cultural Studies, vol. 7, n. 1, 2020

Mobile applications for cultural tourism. St. James Way · Miguel Mazeda & Luís Teixeira

the pilgrim can plan routes and obtain other information, such as support points, sleeping places, car parks, dining areas, help stations and other resources. ("Proteção Civil cria plataforma digital para apoiar os peregrinos", 2017)

This platform worked as a resource to support the pilgrimage, also informing about the care to be taken before the pilgrimage, during the walk and on arrival at the destination. Pope Francis visited Fátima on 12 and 13 May 2017 as part of the celebrations for the centenary of the apparitions. This platform was active for this event only. Users had to register to receive important notices for a safe pilgrimage.

In 2018, in a university context, to promote sustainable tourism an international university project was begun in which Portugal is represented by the University of Minho. The project "The value of human rights on St. James' Way: harnessing the power of tourism to promote intercultural dialogue and the achievement of sustainable development goals" explores tourism as an "instrument of mutual understanding and sustainable development" ("Pelo turismo sustentável nos Caminhos de Santiago", 2018). This project includes 20 universities from 13 countries (USA, Peru, Mexico, Sudan, Portugal, Spain, Denmark, Luxembourg, The Netherlands, Belgium, Poland, Montenegro and France). In an initial phase, the students of these Universities, worked on the main principles and requirements for the development of sustainable tourism as well as the ethical and responsibility principles associated with St. James' Way. During a second phase, students have the opportunity to confront the theoretical analysis with the real situation of the route and understand the viability of their products, their sustainability and the ability to promote local development of the route[18].

Analysis of results and conclusion

This project faces questions that seek an answer that corresponds to the era in which we live. The digital age is the era of readiness and the momentary, a new notification appears every second, software updates are constant and the human being wants to be *always connected* (Palumbo, Dominici & Basile, 2014). We are creating dependencies to a virtual world, the dependence of showing ourselves and the need for social acceptance that reveal the enormous ego that lives within the human being.

Due to this exposure and this desire to be connected, the offer of apps has been growing significantly, increasing the number of possible choices. In 2000, it was already found that internet users exhibited remarkable impatience and insistence on instant gratification (Nielsen, 2000). The offer of new digital solutions must take into account the user's needs and how to promote their use by the public.

In the universe of mobile applications, according to *Fortune*, in an article written by Erin Griffith (2016), we found that in more than 75% of app downloads such apps are

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[18] Retrieved from http://affiliatemembers.unwto.org/content/activity-0

Revista Lusófona de Estudos Culturais / Lusophone Journal of Cultural Studies, vol. 7, n. 1, 2020

Mobile applications for cultural tourism. St. James Way · Miguel Mazeda & Luís Teixeira

used only once. These data reveal that most applications do not offer a good initial experience or do not meet the expectations of users. To overcome these problems and for applications to become an essential resource for the user, they need to ensure usability requirements regarding the design of mobile applications. It is essential to understand the user's objectives in the context of use in order to identify the difficulties in the execution of tasks.

The aim of design is to be invisible to the user. It is important that the user's attention is directed to the execution of tasks. We are facing a great diversity of technologies and technological devices and, therefore, applications must adapt to the functional requirements of devices and operating systems. Thus, if we opt for navigation rules we'll create a more intuitive navigation.

It is important to understand the context of the use of apps by the tourism industry, the use by tourists and educate their understanding of the different stages of their journey, as well as anticipating future developments (Lim, 2012). In this way it will be possible to obtain a better use of any mobile application by the user and guarantee better results. We can see in the mobile applications analyzed in the usability test that they presented some deficiencies, such as the app "Caminho de Santiago Pro", due to the large number of necessary actions for the user to be able to access the content.

Ângela Antunes (2016) interviewed pilgrims and most responded that they take mobile devices with an internet connection for the pilgrimage. This study demonstrates that there is a common interest in the existence of mobile applications on St. James' Way as well as the desire by the pilgrims to use them. Knowledge about existing applications is very limited and their use is even less so. As users of an application to support pilgrims traveling to Santiago, the characteristics that respondents value most are directly linked to the Way, such as:

- information about the stages;
- information about hostels;
- urgent contacts;
- important locations;
- multilingual;
- offline;
- touristic / cultural characteristics;
- general content about the Way.

These characteristics were present in most applications available in online stores. The most interactive and attractive content in terms of image are also valued, and religious characteristics are indicated (Antunes, 2016).

Pilgrims expressed a preference for apps that work offline. However, in the survey carried out in this study, it was found that most of the existing apps work only online. Another topic is the limited real-time information available and its (very basic) nature. This question should be further investigated in a study on how it works (online, offline,

Revista Lusófona de Estudos Culturais / Lusophone Journal of Cultural Studies, vol. 7, n. 1, 2020

Mobile applications for cultural tourism. St. James Way · Miguel Mazeda & Luís Teixeira

synchronization) since it has implications for decisions such as data storage, form of access and availability of information, and when and how to proceed with updates, among other issues. The definition of the functional and operational requirements must also take into account the content made available, and define priorities such as minimizing the access time to information, minimizing battery consumption, or the storage capacity of the device. Mobile systems must be adapted in an effective manner that responds to the needs of the tourist, providing them with personalized information (Oh, Lehto & Park, 2009). In this specific case, it is imperative to think about the pilgrim's context and understand how is it possible to make them continue living the pilgrimage experience in a digital environment and in a situation where they can create their own experiences and share those with other pilgrims.

In the field of tourism, there is a growing interest in the cultural sector and the adoption of mobile applications as tools to support the tourism sector. In the context of the CHIC project, in the initial phase of the first case of demonstration of the framework, mobile applications for St. James' Way available in the app stores were identified and analyzed. There is a great offer of apps on this theme, but none of them stands out in their use of new media such as the use of 360° photography, augmented reality or interactive content. The only one that stands out for its innovation is the "Caminho de Santiago 360°", but the information available to the pilgrim is limited.

Most applications work in online mode and have features such as information about the stages/hostels, urgent contacts, important places, and are multilingual. These are the characteristics most valued by pilgrims with the exception of online operation (preferably offline mode). The development of an application should guarantee the existence of these features. The focus of the app to be developed should be on the production of high quality digital content, a very limited component in current apps.

Translation: Jorge Almeida e Pinho

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Revista Lusófona de Estudos Culturais / Lusophone Journal of Cultural Studies, vol. 7, n. 1, 2020

Mobile applications for cultural tourism. St. James Way · Miguel Mazeda & Luís Teixeira

Appendixes

Name	Developer	Type
Guide of the Way of St James	Buen Camino	Online
Camino(Eroski Consumer)	BIKO	Online
Camino Aragones – A Wise Pilgrim Guide	Wise Pilgrim	Online
Camino de Invierno – A Wise Pilgrim Guide	Wise Pilgrim	Online
Camino de Santiago – Bono Lacabus	Xunta de Galicia	Online
Camino de Santiago – Camino Frances 2.0	CNIG	Online
Camino de Santiago del Sur a la Vía de la Plata. Sevilla - Mérida	Imagen MAS	Online
Camino del Salvador – A Wise Pilgrim Guide	Wise Pilgrim	Online
Camino Finisterre – A Wise Pilgrim Guide	Wise Pilgrim	Online
Camino Frances – A Wise Pilgrim Guide	Wise Pilgrim	Online
Camino Guide	Jack Fellows	Synch
Camino Primitivo – A Wise Pilgrim Guide	Wise Pilgrim	Online
CaminoDeSantiago	COTESA	Online
eCamino	eCamino Kft	Synch
Esoteric Camino France & Spain	Sutro Media	Synch
Le Puy / GR65	AgenceTNT	Online
TrekRight	Eugene Mallay	Online
Via Plata IT	IndependenTrip	Online
Visitabo Santiago de Compostela	ALHENA APP TRAVEL	Synch
Way of St. James, St Jacobs Route Map	Dubbele.com	Synch

Table 1: List of mobile applications on St. James' Way for iOS

Name	Developer	Type	Availability
Albergues_2.0	HLE Aplicaciones	Offline	Not available
Augmented Reality St James Way	Ricardo Meana	Online	Available
Buen Camino	Chaligne Aurore	Offline	Available
Caminho de Santiago Pro	Editorial Buen Camino	Online	Available
Camino de Santiago 360°	IRALTA FILMS S.L.	Online	Available
Cno. Santiago	CNIG	Online	Available
Camino de Santiago	COTESA	Online	Available
Camino de Santiago Guide	CaminoGuide.net	Offline	Available
Camino de Santiago Guide v2.0	Tournride.com	Online	Available
Camino de Santiago HD	CNIG	Online	Not available
Camino de Santiago my mobile	Miguel Angel Zamorano Porras	Online	Not available
Camino de Santiago, Aragones	DeNAide	Online	Not available
Camino de Santiago, Baztanes	DeNAide	Online	Not available
Camino Frances – Wise Pilgrim	Wise Pilgrim	Online	Available
Camino Frances IT	IndependenTrip	Online	Available
Camino Pilgrim – Frances	Aurea Moemke	Online	Available
Camino Portugues IT	IndependenTrip	Online	Available
Camino Sanabres IT	IndependenTrip	Synch	Available
Caminos de Santiago Eroski	Eroski Consumer	Online	Available
Caminos de Santiago	IndependenTrip	Online	Available

Revista Lusófona de Estudos Culturais / Lusophone Journal of Cultural Studies, vol. 7, n. 1, 2020

Mobile applications for cultural tourism. St. James Way · Miguel Mazeda & Luís Teixeira

eCamino	eCamino Kft	Synch	Available
ElCaminoenGPS_Burgos-Leon	Bluguîa, S.L.	Online	Not available
ElCAMINOenGPS_Galicia	Bluguîa, S.L.	Online	Not available
ElCaminoenGPS_leon-Pedrafita	Bluguîa, S.L.	Online	Not available
ElCaminoenGPS_Logroño-Burgos	Bluguîa, S.L.	Online	Not available
ElCaminoenGPS_Pirineos-Logroño	Bluguîa, S.L.	Online	Not available
Esoteric Camino France & Spain	Sutro Media	Online	Not available
Hotêis do Caminho de Santiago	Xose Zapata	Online	Available
Le Puy / GR65	AgenceTNT	Online	Available
Los Caminos de Santiago	DeNAide	Online	Available
my Camino de Santiago (mi Camino)	micaminodesantiago.com	Online	Available
OCamiñoenGPS_Burgos-León	Bluguîa, S.L.	Online	Not available
OCAMIÑOenGPS_Galicia	Bluguîa, S.L.	Online	Not available
OCamiñoenGPS_León-Pedrafita	Bluguîa, S.L.	Online	Not available
OCamiñoenGPS_Logroño-Burgos	Bluguîa, S.L.	Online	Not available
OCamiñoenGPS_Pirineos-Logroño	Bluguîa, S.L.	Online	Not available
Road to Santiago	Valerio Grosso	Online	Not available
Santiago de Compostela	Información e Comunicación Local, SA	Online	Available
Camino Santiago Bono Iacobus	Xunta de Galicia	Online	Not available
The Way of Saint James	SEGITTUR	Online	Available
TheWayofStJames_PirineosLogroño	Bluguîa, S.L.	Online	Not available
TheWayofStJames_Burgos-Leon	Bluguîa, S.L.	Online	Not available
TheWayofStJames_León-Pedrafita	Bluguîa, S.L.	Online	Not available
TheWayofStJames_Logroño-Burgos	Bluguîa, S.L.	Online	Not available
TheWayofStJamesinGPS_Galicia	Bluguîa, S.L.	Online	Not available
Tu Camino	Pordefacto, s.l.	Online	Available
Ultreia! Camino Francés	Professor Lidenbrock	Online	Available
Via de la Plata IT	IndependenTrip	Online	Available
Visitabo Santiago Compostela	ALHENA APP TRAVEL	Synch	Available
Camiño de Santiago en Galicia	Xunta de Galicia	Synch	Available

Table 2: List of mobile applications on St. James' Way for Android

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Revista Lusófona de Estudos Culturais / Lusophone Journal of Cultural Studies, vol. 7, n. 1, 2020

Mobile applications for cultural tourism. St. James Way · Miguel Mazeda & Luís Teixeira

184

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