Making Heritage Accessible: Usage and Benefits of Web-based Applications in Cultural Tourism

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Abstract

Based on a literature review in academic journals, this paper examines the usage and benefits of web-based applications in cultural tourism for making cultural heritage accessible. A total of 17 research papers addressing this topic were identified. The analysis of the available research suggests that the use of web-based applications helps to make cultural heritage more accessible for different visitors segments. Applications such as online travel planners, mobile tour guide systems, or review portals support the consumer's experience before, during or after the visit. Additionally, mobile and 3D applications help to make complex cultural phenomena more easily understandable for user and allow entertainment-oriented learning. However, the respective research in cultural tourism is still at the very beginning. Based on the findings, we identify research gaps regarding, for example, the considerable concentration of literature on specific applications and travelling stages of a visit. Our paper concludes with recommendations for future research.

Keywords: *cultural tourism; cultural heritage;, accessibility; e-services; mobile applications; 3D applications*

JEL Classification: M15 – IT Management

1. Introduction

Many segments of the tourism industry increasingly use digital, web-based applications and services to attract and serve relevant target groups (Papathanassis & Buhalis, 2007; Law et al., 2010). Tourism providers employ e-services, mobile applications or social media to meet the changing needs and usage habits of their clients more effectively (Chu et al., 2012). It is in this context, that web-based technologies not only facilitate access to information and extended services (Buhalis & Law, 2008) but also simplify and improve the use of tourism products (Akehurst, 2009) and help tap new tourist segments (Thomas et al., 2010; Law et al., 2010).

Attracting and serving visitors in accordance with their needs is considered a success factor also in cultural tourism (Hausmann, 2007; duCros & Mc Kercher, 2015). Cultural tourism includes movements of persons to cultural heritage attractions with the intention to gather new information and experiences to satisfy cultural needs (WTO, 1985; Richards, 1996; Whyte et al., 2012). Cultural heritage comprises "both tangible assets, such as monuments, archaeological sites or sculptures, and intangible assets such as oral traditions, performing arts and rituals" (UNESCO, 2015a). The development and utilization of cultural heritage is not only economically relevant for many destinations but is also regarded as a key cultural and social objective (UNESCO, 2015b). It is therefore a central concern of both cultural tourism and heritage management "to make conserved heritage accessible physically and intellectually for use, enjoyment and education" (duCros & McKercher, 2015: 50).

But to what extent are web-based applications and services already being used to make cultural heritage accessible and what are the benefits for providers and clients? The present study aims to answer this question by systematically analysing the status quo of research in internationally acknowledged academic journals. To achieve this research objective, the study is structured as follows: The research object is first defined more closely, followed by a presentation of the results of the literature review, which was carried out by the authors in the early summer of 2015 and repeated at the beginning of 2016. The findings of the status quo analysis are then discussed. The study is concluded by recommendations for future research in cultural tourism based on this discussion.

2. Framework

The Internet has turned from a mere information medium to a globally used platform for communication, participation and networking at an impressive pace (Baresi et al., 2000; Chen & Macredie, 2010). Web-based technologies are an important element of this development. As a newly emerging research area, web-based applications and services have no globally accepted definition yet. Typically, however, the term is used to describe technologies that can be used with the help of a web browser and have an interactive, collaborative and multimedia orientation (e.g. Thomas et al., 2010; Sánchez Laws, 2010). It is a great advantage of web-based applications that they can be personalised, i.e. their functionality and their content can be adjusted to the individual needs and (technical, intellectual) abilities of different users (Kramer et al., 2007; Chen & Macredie, 2010; Moreno et al., 2012). Moreover, web-based applications can be used anywhere in the world regardless of the location and time, which, in a tourism context, means that they can be used during the different travelling stages (e.g. Dye & Shaw, 2007; Gretzel, 2009). At the same time, unlimited connection with other web-based applications and systems is possible, resulting in extensive potential uses for destinations in cooperation with a large number of tourism providers (e.g. Brambilla et al., 2006; Dye & Shaw, 2007). The most important web-based technologies are presented below; due to the technical possibilities of many applications, it is, however, impossible to categorise them without some overlaps:

The information and communication technologies (ICT) used in the context of tourism are discussed under the general term of e-services (Buhalis & Law, 2008; Chiabai et al., 2013). E-services not only open up new distribution channels for tourism (e.g. in the form of online booking systems) but also permit new

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communication platforms for providers and buyers of tourist services (e.g. e-forums) as well as extended services (e.g. interactive maps, virtual tours, journey planners und personal profiling).

3d applications typically show a part of the real world, complement it or create (new) virtual worlds in which one or several participants can act simultaneously (Manninen & Pirkola, 2001; Herring et al., 2003). These include, for instance, augmented reality (AR) and geocaching (Smith, 2014). AR combines the real space with digital information in the form of embedded information layers. On mobile devices (usually smartphones or tablet computers) a digital layer is laid onto the physical world in real time (e.g. additional images, 3D models) (Egger & Horster, 2014). By contrast, geocaching is a modern form of treasure hunting, for which mobile terminals with GPS (Global Positioning System) reception are used to find secret caches in certain places or to solve riddles in the urban space (Hausmann & Frenzel, 2014).

Mobile applications include, for instance, location-based services (LBS), mobile apps and mobile websites. LBS provide more detailed information about the geographic position of a user; once the user is localised a location-based map is transmitted to his/her mobile device (Egger & Horster, 2014). Mobile apps are programmes for smartphones and tablet computers which users can download and use, partly without Internet connection (Weithöner, 2015). Another application is the mobile version of touristically relevant websites, whose layout is adapted to the smaller monitors and browsers of mobile terminals, making them more user-friendly (Weithöner, 2015).

Social media describes groups of web-based applications which facilitate the communication and sharing of travel reports (recommendations, experiences, etc.) and other touristically relevant information (e.g. photos, videos) among friends, followers and other contacts (Sotiriadis & van Zyl, 2013). A distinction can be made between the following types (Hausmann & Pöllmann, 2013; Sotiriadis & van Zyl, 2013): blogs and micro-blogs (e.g. Instagram, travel blogs, Twitter), social networking sites (e.g. Facebook, LinkedIn, Foursquare), collaborative projects (e.g. Wikipedia), content community sites (e.g. YouTube, Flickr), review portals (e.g. Tripadvisor), virtual worlds (e.g. Second Life) and virtual games.

Following this overview of examples, the potential arising from the use of web-based applications and services from the point of view of general tourism research will be outlined. This potential arises from the characteristic features of tourist products, as the tourism industry primarily offers products characterised by a high degree of intangibility (e.g. Smith, 1994; Freyer, 2006). This means that tourists usually cannot check the quality of services prior to booking or making a trip (Glaesser, 2006). Instead, the quality can mostly be assessed during or after a trip, in some cases not at all (e.g. due to a lack of previous experience or possibilities for comparison) (Buhalis & Law, 2001). This increases the psychological risk of making a wrong decision and leads to uncertainty on the part of the client. "Expressed in information-economic terms, the tourism product is a belief or trust product that demands that the supplier is able to reduce uncertainty and risk, above all, in relations with potential customers" (Glaesser, 2006: 25).

This uncertainty can be reduced with the help of web-based applications and services, and this is possible in all three travelling stages, i.e. before, during and after a trip. (Nielsen & Liburd, 2008; Gretzel, 2009). Users may, for instance, consult social networks, blogs or feedback pages before their trip to make it easier to decide on a destination or plan a trip (e.g. advance reservation of tickets, tours, etc.). During the trip, location-based services or mobile websites may be used for navigation and – e.g. when short-term decisions need to be made at the destination – to update information about certain nearby attractions (Nielsen & Liburd, 2008; Gretzel, 2009; Wang et al., 2014). After the trip, social media may be used to publish ratings and opinions or to document experiences and share them with others (Xiang & Gretzel, 2010).

These potential uses of web-based applications and services generally also appear interesting to cultural tourism providers. In this context, it is of special importance that cultural heritage requires a great deal of explanation. Especially tourists with less cultural experience, whose uncertainty about the quality of culture-related services is particularly high, need information that is easy to understand and presented in an entertaining way (duCros & McKercher, 2015). In addition to that, it is sometimes impossible to make the cultural heritage fully accessible "on-site" due to conservation concerns, cultural sensitivities or safety issues (ICOMOS, 2015). It is therefore safe to assume that cultural sites can be made more readily accessible

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through the use of web-based applications (e.g. through "off-site" interpretations and presentations), which could also open them up to new target groups (Sigala, 2006; Brizard et al., 2007). This way, web-based applications and services could increase both the intellectual and the physical accessibility of cultural heritage while at the same time considering conservation requirements, which is regarded as particularly desirable in terms of cultural policy (UNESCO, 2015c). The following analysis of the status quo of research is designed to examine whether more detailed considerations have already been made in this respect.

3. Methodology

To determine the current state of research, a systematic keyword search was conducted in EBSCOhost (http://search.ebscohost.com), one of the largest and most popular databases for internationally acknowledged academic journals, in the early summer of 2015 and, again, at the beginning of 2016. A total of 13 terms were used ("3D", "apps", "augmented reality", "digital", "e-tourism", "e-services", "geocaching", "ICT", "location based services", "mobile", "social media", "virtual", "web-based"), each of which was researched in EBSCO in combination with "cultural tourism" and "heritage".

The keyword search yielded over 50 hits. In a next step, these hits were analysed more closely with regard to the subject terms, author-supplied keywords and the abstract of each article, with the aim of identifying articles that were relevant for the topic of the present study and to eliminate those that were not relevant. Only those articles whose contents related to cultural tourism and in which web-based applications were analysed in the context of the accessibility of cultural heritage were to be included in the further analysis. Articles with a purely technical reference which primarily addressed conservation and protection issues or legal questions (intellectual property, copyrights regulations, digitalisation policies etc.) and were therefore mostly relevant for restorers, architects, designers or lawyers (e.g. Anderson, 2013; Dowding, 2014; Galiotou, 2014), were excluded from the analysis. Where articles had been published in different journals but addressed essentially identical issues using largely identical analysis methods, only the article first published by an author was analysed; this primarily applied to publications in the field of e-services. After this multi-stage approach, 17 relevant articles published between 2008 and 2014 were identified; the attempt to trace references cited in the published articles did not lead to the identification of other peer-reviewed papers in academic journals. In the following, we will first outline the contents of the articles before discussing them with a view to the research objective.

4. Findings

Considering the categories of web-based applications listed in section 2, the 17 articles can be grouped as follows (see table 1): Eight articles are about e-services, five about mobile applications and four about 3D applications; no article addresses social media. With regard to the cultural tourism regions, the focus has been mainly on Southern and Central Europe. With a view to the research objects chosen, the examinations in 15 articles were related to a certain site or city, while two articles examine e-tourism websites of different cultural tourism providers. As far as the method is concerned, most of the publications (n=12) take a qualitative approach. Only three articles are based on quantitative research design and one article uses a mixed method approach. One paper takes a purely theoretical/conceptual approach. A more detailed presentation of the results of the literature review, grouped by type of application and service, is provided in table 1. In the following, our findings will be discussed in more detail.

4.1. E-Services
Of the eight articles addressing e-services, six are about the European Union's ISAAC Programme ("Integrated e-services for advanced access to heritage in cultural tourism destinations"). One of the aims of the ISAAC Programme is to facilitate the participation of relevant users (e.g. tourists, local residents, decision-makers) in decision-making processes and to support the consumer's experience before, during and after the visit to a cultural site or destination (ISAAC, 2006). The studies identified in our review also

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primarily address these two aspects. Paskaleva-Shapira et al. (2008), Paskaleva & Azorín (2010) and Paskaleva & Azorín (2011) use qualitative methods to analyse the potential of e-services in the cities of Amsterdam, Leipzig and Genoa based on the example of the ISAAC Programme. The authors show that the management of cultural tourism destinations can be improved if all stakeholders are involved in important decision-making processes. Chiabai et al. (2013), who examine the ISAAC Programme in Genoa using focus groups with different stakeholders (residents, providers, tourists and external service providers) arrive at a similar result. They found that the sustainability of cultural tourism measures can be increased if all players are involved in decision-making processes with the help of e-services.

The studies by Nijkamp et al. (2011) and Strielkowski et al. (2013), which also relate to the ISAAC Programme, have a more service-oriented focus. Nijkamp et al. (2011) examine the use of e-services in two quantitative studies with tourism experts and visitors (n = 650) based on the example of the ISAAC Programme in Amsterdam. The surveys showed that tourism experts primarily use download content, whereas visitors attach greater importance to e-forums, interactive games, and multilingual applications. Strielkowski et al. (2013) conducted a visitor survey (n=3,100) to examine the implementation of the ISAAC Programme in Amsterdam, Genoa and Leipzig and especially the importance of certain e-services during the three travelling stages. It turned out that most visitors use e-services before a trip (e.g. booking services, journey planners). During and after a trip, however, e-services were hardly used by the visitors. The study also showed that the visitors surveyed expected web-based applications to have certain quality features such as "ease of use", "security" and "up-to-dateness" as well as "reliability of the information".

Apart from the six articles mentioned above, two studies examined e-services independently from the ISAAC Programme. Lazarnis et al. (2008) analysed 20 websites of selected transport firms, tour operators and hotels with regard to the functionality of the applications and services (booking-systems, e-mail support, online payment, information provision). Kourtit et al. (2011) took a theoretical/conceptual approach to analyse the social and economic impact of e-services on the cultural tourism industry as well as the opportunities and risks of e-services for the positioning of cultural destinations. The results of the articles primarily allowed conclusions to be drawn with regard to the user and service orientation of e-services. They showed, for instance, that e-services improve the customer service and, consequently, facilitate customer retention. The biggest weaknesses of e-services that were identified are the lack of personal customer contact and the high maintenance costs resulting from regular updating of the applications and information.

4.2.   Mobile Applications

Five of 17 surveys relate to mobile applications and their potential for personalising tourist offerings and making cultural sites accessible. Four of these five articles primarily analyse the potential of mobile tour guide systems. Damiano et al. (2008) examine the potential of mobile tour guide systems using a mix of qualitative and quantitative research. Based on a case study, they initially examine an application in which a virtual character ("Carletto the Spider") can be downloaded onto a mobile device as a tour guide. The position of the device is located using a WLAN connection and the location-based information is communicated to the user via the virtual character. The application was then evaluated by the users (n=300). It turned out that the users desired a stronger personalisation of the app, i.e. its adaptation to personal interests and demands (e.g. choice of different tour guide characters). The article by Suh et al. (2009) also discusses the potential of mobile tour guide systems on the basis of a case study. The authors also identified the possibility of obtaining location-based information and of personalising the mobile tour guide – e.g. also by storing data about the user's interests which may then be used by the system to point out certain information and highlights – as an important function of web-based technologies.

The study by Koukopoulos & Styliaras (2013) confirms the potential of mobile tour guide systems for making cultural heritage accessible to cultural tourists. In the context of a theoretical/conceptual study, the authors examine the communication, navigation and entertainment potential resulting from the use of such mobile applications. They arrive at the result that the perception of cultural destinations is positively influenced by mobile tour guide systems and accordingly by the possibility to obtain location-based and interest-related information. As a consequence, cultural heritage marketers may use the technology to allow a more individualised visitor experience. The article by Grainger Clemson (2014) also examines the influence of mobile applications on the perception of cultural destinations. By using qualitative methods (observations, interviews), the author demonstrates that the use of mobile applications changes the perception of cultural

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spaces and the visitor experiences in such spaces. Her study shows that the interpretation of spaces becomes more "hybrid", i.e. the actual historical significance of cultural spaces is mixed with the individual, present day interpretations of the visitors.

Taking everything into account, most of the authors arrived at the conclusion that mobile tour guide systems offer considerable potential for making cultural heritage sites and destinations accessible. But they also identified problems that may result from the use of mobile tour guide systems. Some of the systems currently in use still leave to be desired in terms of technical implementation and functionality (Damiano et al., 2008, Suh et al., 2009). It is also problematic that not all users are willing to disclose their personal data (Suh et al., 2009).

The article by Etxeberria et al. (2012) examines the use of mobile applications based on the example of augmented reality (AR) and geocaching. They conducted a qualitative study to examine the potential of mobile applications based on the example of nine archaeological sites in the Mediterranean. The authors state that applications such as AR and geocaching offer considerable added value primarily for young cultural tourists. The interactive applications enhance the perception of a cultural site and the visitor experience and facilitate a more in-depth educational experience. In view of the fact that growing use is made of mobile applications, the authors recommend that cultural heritage sites cater to visitors' changing requirements by creating suitable offerings (e.g. extended availability of WLAN, provision of mobile devices, etc.).

4.3. 3D Applications

All four studies on the potential of 3D-based applications for making cultural tourism destinations and cultural heritage accessible focus on the aspect of "edutainment", i.e. entertainment-oriented learning. The case study by Bogdanovych et al. (2010) examines a 3D-based game in which the ancient city of "Uruk" in Mesopotamia was reconstructed as a virtual world with the help of expert knowledge as well as archaeological and historical documents. Based on the example of a family of fishermen, four virtual characters were developed who can be navigated by the user in the virtual world of Uruk. Chen et al. (2010) also analyse the possibilities for playful learning offered by virtual presentations based on the example of the "Jing-Hang Grand Canal" in China. Among other things, visitors can use a 3D-based animated clip which shows the transport routes and ancient cities along the canal and helps to expand their knowledge of the culture, history and art of the canal in a playful manner.

The articles by Garau (2014) and Pantano & Corvello (2014) examine the potential uses of 3D-based applications in the context of guided tours. Garau (2014) analyses the possibilities offered by augmented reality (AR) to communicate cultural tourism information based on the example of the Italian city Cagliari. The author identifies two potential uses of AR. First, the multimedia presentation (e.g. charts, audio files or simulations) makes complex cultural phenomena more easily understandable for the user; second, it allows the transformation history of a cultural attraction to be presented more clearly. Pantano & Corvello (2014) identified additional potential uses in their quantitative study on a virtual tour of the ancient city of Locri in Italy. A visitor survey (n=100) showed that such a 3D-based tour allows the visitor to deal with the tourism product already during the first phase of a trip, i.e. "off site". This means that the availability of a 3D-based tour can make it easier for the visitor to choose and decide between different destinations.

5. Discussion

The aim of the present study was a systematic search for and analysis of research papers in internationally acknowledged academic journals addressing the usage and benefits of web-based applications and services in cultural tourism for making cultural heritage accessible. As shown in table 1, a total of 17 research papers addressing this topic were identified. This shows that the respective research in cultural tourism is still at the very beginning. At the same time, it should be noted, however, that most of the articles (n=8) were published in the past three years. In view of the up-to-dateness of the topic, it is to assume that research in cultural tourism on this subject will increase in the coming years.

With regard to the applications examined in the articles covered by the present study, it is to be stated that research currently focuses primarily on e-services, whereas the other three technologies presented in section two have so far been neglected. While at least some initial research has been done into 3D applications and mobile applications – which suggest that these applications are of great use for cultural tourism providers,

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cultural heritage marketers and cultural tourists – the potential of social media for making cultural heritage accessible to tourists and marketing has not been researched at all. This research gap is all the more surprising as several papers have already addressed the possibilities offered by social media for arts organizations in other cultural management contexts (e.g. Hausmann & Pöllmann, 2013; Smørdal et al., 2014; Theorcharidis et al., 2014). The findings made in these studies suggest that social media offer considerable interaction and participation potential, help targeting specific consumer segments and support positioning an arts organization, which could be interesting also in a cultural tourism context.

With a view to the research objects chosen, it is to be stated that research has exclusively addressed tangible cultural heritage so far, which means that no studies on the development and marketing of intangible cultural assets as defined by UNESCO exist (UNESCO, 2015c). This research gap is surprising insofar as it is safe to assume that the typical characteristics of web-based applications (interaction, participation, etc.) make them particularly suitable for the didactic presentation and communication of intangible cultural heritage (e.g. oral traditions and rituals, language) (duCros & McKercher, 2015). What is more, the studies available to date only address the potential of web-based applications for the "on-site" accessibility and marketing of cultural heritage. Researchers have so far ignored the importance of web-based applications for the "off-site" interpretation, presentation and, hence, improved accessibility of cultural heritage that is otherwise inaccessible due to conservation concerns or cultural sensitivities.

The analysis of the articles also shows that the potential of web-based applications and services in a cultural tourism context generally takes effect in all three travelling stages. So far, however, research has mainly focused on the first phase (before), with the main emphasis placed on the technical possibilities of e-services (online booking systems, information portals and travel planners) and the evaluation of these applications by providers, experts and visitors. The potential during the second phase of a trip (during) is analysed only superficially and is confined to 3D and mobile applications, whereas the benefits of social media have been neglected up to now. There are no studies at all on the potential of web-based applications in the third phase of a trip (after). General tourism research has shown, however, that web-based applications (especially travel blogs, social media) are particularly suited to make tourist services accessible and market them also during the last phase of a trip, e.g. by sharing the experience with the help of photos and reviews (e.g. Law, 2005; Law et al., 2010, Xiang & Gretzel, 2010).

In conclusion, it should be pointed out that making cultural heritage – physically and intellectually – accessible is defined as a primary cultural policy objective (Brizard et al., 2007; UNESCO, 2015a). In this context, it is striking that the studies to date have focused on Southern and Central Europe, which means that research currently covers only a small part of the regions that are relevant in terms of cultural tourism. Moreover, many studies analyse individual cases; only in few cases are the results based on quantitative analyses. This means that many of the results that are available to date must be regarded as preliminary until they are confirmed by studies with a representative research design.

In summary, our systematic analysis of the status quo arrives at the result that research into the matter is still at its very beginning. And although it cannot be ruled out that, in spite of a careful search, individual relevant articles in academic journals were overlooked – which is the case with every review (e.g. Kitchenham et al., 2009) – it is safe to assume that the number of such publications is negligible, which means that the results of the present study would not change materially.

6. Research Implications

The implications that can be derived from the available findings for future research are outlined below. As explained above, we confined our search to publications in internationally acknowledged academic journals – as is usually the case with literature reviews (e.g. Kitchenham et al., 2009) – in order to ensure a systematic approach. This means that studies published in edited volumes, conference proceedings, research reports, etc. were not taken into consideration. Our result thus relates exclusively to the state of research in academic journals. A next research step should expand the search to other publication types and combine the respective findings with the results of the present review. In view of the topicality of the research object and the ongoing development in the field of web-based technologies, a second search run in EBSCOhost would be recommendable.

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Our analysis has shown that the studies available to date mostly take a qualitative approach and were carried out on the basis of a single case study. To obtain more representative results, empirical studies using the mixed methods approach are highly recommended. Building on the present results, it would be recommendable to initially hold qualitative interviews with selected cultural tourism and cultural heritage marketing experts. Based on this, a broader-based quantitative study, which asks different players (cultural heritage managers, tourism providers, visitors) about the potential of web-based applications and services could result in more in-depth findings.

Such a study could close some of the research gaps identified above. On the one hand, it would be possible, for instance, to ask the visitors in detail about the perceived benefits which web-based technologies have during the three travelling stages. The results could be equally interesting to tourism providers and cultural heritage marketers with regard to the travel phase-specific use of web-based applications for the marketing of cultural destinations. On the other hand, cultural heritage managers and tourism providers could be interviewed about their specific experience with regard to the potential of web-based technologies in conjunction with intangible cultural heritage. Best practice examples could then be identified, which could be used for making accessible and marketing intangible cultural heritage also at other cultural destinations.

Table 1. Results of Review.

	Author	Application	Region	Research Object	Methodology	Unit of Analysis
1	Bogdanovych et al. (2010)	3D-based	Mesopotamia	Virtual city "Uruk"	qualitative	Case study; evaluation test among users (n= 10)
2	Chen et al. (2010)	3D-based	China	Jing- Hang Grand Canal	qualitative	Case study
3	Chiabai et al. (2013)	e-services (ISAAC)	Italy	Genoa	qualitative	Case study; stakeholder interviews (n=4); focus groups (n=8-11)
4	Damiano et al. (2008)	mobile- based	Italy	Palazzo Chiablese (Torino)	qualitative, quantitative	Case study; evaluation survey among users (n=300)
5	Etxeberria et al. (2012)	mobile- based	Spain; Greece; Italy; Germany; Austria	Various European Cities	qualitative	Case studies
6	Garau (2014)	3D-based	Italy	Cagliari	qualitative	Case study
7	Grainger Clemson (2014)	mobile-based	UK	**Coventry**	qualitative	Case study; observation; interviews (n= unknown)
8	Koukopoulos, & Styliaras (2013)	mobile- based	Greece	Cultural sites in general	qualitative	Case study
9	Kourtit et al. (2011)	e-services	Worldwide	**e-tourism websites**	theoretical/ conceptual	-
10	Lazarinis et al. (2008)	e-services	Greece	**e-tourism websites**	qualitative	Evaluation of **e-tourism websites** (n=20)
11	Nijkamp et al. (2011)	e-services (ISAAC)	Netherlands	**Amsterdam**	quantitative	Survey with experts and visitors (n= 650)
12	Pantano, & Corvello (2014)	3D-based	Italy	Locri	quantitative	Survey (n=100)
13	Paskaleva-Shapira et al. (2008)	e-services (ISAAC)	Italy	Genoa	qualitative	Case study; interviews (n=37)

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14	Paskaleva & Azorín (2010)	e-services (ISAAC)	Europe	Amsterdam, Genoa, Leipzig	qualitative	Case studies
15	Paskaleva & Azorín (2011)	e-services (ISAAC)	Europe	Amsterdam, Genoa, Leipzig	qualitative	Case studies
16	Strielkowski et al. (2013)	e-services (ISAAC)	Europe	Amsterdam, Genoa, Leipzig	quantitative	Visitor survey (n=3100)
17	Suh et al. (2009)	mobile- based	Korea	Cemetery site	qualitative	Case study; Evaluation test among users (n= 12)

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