

Validation of a Gamified Mobile Experience by DMOs

Ander Garcia, María Teresa Linaza, Aitor Gutierrez
and Endika Garcia

Abstract Gamified mobile experiences offer several potential benefits to Destination Management Organizations (DMOs), such as encouraging engagement, enhancing experiences, improving loyalty, or increasing brand awareness of tourists. Moreover, they also offer a new source of interesting information about tourists. However, examples of DMOs applying gamification for the on-site phase of the trip, validation of its impact and exploitation of information gathered from gamified mobile experiences are still lacking. This paper focuses on these issues, presenting a gamified mobile experience generated by three DMOs and validated by real tourists in two villages of the Basque Country during seven weeks. Data obtained both from tourists and from an analytics tool integrated with the mobile experience have been analysed, highlighting the benefits of gamified experiences and the relevance of analytics tools for DMOs.

Keywords Gamification · Mobile experience · DMO · Analytics

1 Introduction

The tourism industry has already used game elements during all the trip phases (Negruşa, Toader, Sofică, Tutunea, & Rus, 2015) such as in pre-trip marketing campaigns of some destinations or in the frequent flyer programs. However, only

A. Garcia (✉) · M.T. Linaza · A. Gutierrez
Vicomtech-IK4, San Sebastián, Spain
e-mail: agarcia@vicomtech.org

M.T. Linaza
e-mail: mlinaza@vicomtech.org

A. Gutierrez
e-mail: agutierrez@vicomtech.org

E. Garcia
Batura Mobile Solutions, Bilbao, Spain
e-mail: endika@baturamobile.com

few Destination Management Organizations (DMOs) have developed gamified experiences. Although several benefits of gamified experiences have been highlighted (Xu, Weber, & Buhalis, 2014; Negruşa et al., 2015; Garcia, Linaza, Gutierrez, Garcia, & Ornes, 2016), such as the increase in the duration of visits or the uniform distribution of tourists through the destination, there is a research gap related to gamification examples and the analysis of their impact on tourist destinations.

Gamified mobile experiences provide DMOs with a new channel to interact with tourists, as they do not only allow DMOs to influence the behaviour of tourists, but also open new opportunities to gain insights of their real on-site behaviour. The impact of these experiences can be measured on the basis of analytics tools, so that interaction data traces gathered by the mobile applications become a new valuable information source for DMOs. This information can be used not only to offer better experiences to tourists, but also to improve the decision making process of DMOs. Furthermore, this information might be shared with local tourism service providers to improve their knowledge about their customers.

This new interaction channel and information source might be even more relevant for small and medium sized DMOs, which usually lack resources to measure their impact and access information about the behaviour of tourists on-site.

This paper targets these issues, focusing on the validation of two hypotheses about gamified mobile experiences focused on the on-site phase of the trip. First, three DMOs have defined and generated a gamified mobile experience, which has been validated by real tourists for seven weeks. Finally, in order to provide an additional valuable information source for DMOs, data provided by tourists and analytics data automatically gathered by the mobile experience during this period have been analysed.

This paper has been organised as follows. Section 2 reviews the state of the art of the application of gamified mobile experiences and analytics tools in the tourism and gamification domain. Section 3 presents the research objectives. Section 4 focuses on a gamified mobile experience and its validation by real tourists. Finally, Sect. 5 summarises the conclusions and proposes some future work.

2 State of the Art

2.1 *Gamification Applied to Destination Management Organizations (DMOs)*

The term gamification was defined by Deterding, Dixon, Khaled, and Nacke (2011) as “the use of game design elements in non-game contexts”. Thus, they differentiate gamification from related concepts such as serious games (use of full-fledged games in non-game contexts) or pervasive games (extension of games to new environments). Moreover, gamification aims at changing the behaviour of users for wanted and

desirable activities through extrinsic and intrinsic motivation. The former refers to activities which are only performed in order to achieve some distinct outcome in forms of rewards, while the latter is defined as the performance of an activity for its inherent satisfaction rather than for some separable consequences (Ryan & Deci, 2000).

Although this definition has been broadly accepted, several researchers have proposed further extensions and adaptations for different domains. Interested readers are directed to the work of Seaborn and Fels (2015), who present an updated research about gamification. This research defines the terminology and concepts associated to gamification, and reviews existing literature. While gamification has been applied in several domains, its positive effects depend on the application context (Hamari, Koivisto, & Sarsa, 2014).

Different researchers have studied the application of gamification in the tourism industry (Buhalis, Wagner, & Kingdom, 2013; Xu et al., 2014, 2015; Negruşa et al., 2015; Garcia et al., 2016). However, the level of adoption of gamification among DMOs is very limited (Buhalis et al., 2013). After analysing 44 European destinations, Peretta (2014) concludes that only seven DMOs have mobile applications integrating gamification techniques. Recently, Sigala (2015a) has reviewed gamification examples aiming to influence before, during and after the purchase/consumption of the tourism experience.

This paper focuses on the application of gamification by DMOs for the on-site phase of the trip. On this phase the objective of gamification is to motivate the customers (tourists) to increase the level of their consumption and the use of the firm (destination) products, while also generate enjoyable and memorable experiences (Sigala, 2015a).

Early examples were mainly related to gamified location-based marketing applications such as Foursquare (Cranner, Ahmet, Rost, & Holmquist, 2011). Some real examples (Garcia et al., 2016) include gamified travel tours for urban and rural environments and initiatives such as the Stockholm Sound project promoted by the Visitors Board, or the mobile application Epic Mix developed to enhance the experience of skiers and snowboarders.

Recently, Nunes and Mayer (2014) analyse the acceptance of a gamified mobile experience in a Brazilian nature area, identifying the potential of such experiences to enhance the visiting experience. Lim, Taylor, and Gallacher (2015) present a gamified application for walkers and bikers to generate benefits for local communities of rural tourism areas. They validate its benefits for both tourists, who become aware of local resources; and for local suppliers, who gain a new advertisement channel. The city of Pafos has also created a gamified destination application (Pafos Treasure Hunt) to inform and motivate visitors to explore and learn about the destination. The application has enabled the destination to attract more visitors and to persuade visitors to spend more time and money at places, while providing relevant data about tourists (preferences, feedback, visitation paths, spending behaviour) (Sigala, 2015a).

Furthermore, the “Discover Hong Kong City Walks” mobile application, promoted by the tourism board of the city, offers tourists walking tours in the city, including several interesting points of interests (POIs). Whenever tourists complete at least half of a walk, tourists receive a “stamp” of a tour. This mobile application

has been available since 2011 on Android and iOS devices, accounting for between 50,000 and 100,000 downloads at Google Play (no data on iOS downloads available) (Stadler & Bilgram, 2016).

However, even if there are studies about the benefits of gamification in different domains (Hamari et al., 2014), and despite the previous potential benefits of gamification in tourism, there is still a research gap about best practices and its real impact (Sigala, 2015b). Moreover, DMOs also require examples of tools measuring the impact of these experiences, as the analytics tool presented on the next section.

2.2 Analytics Applied to Destination Management Organizations (DMOs) and Gamification

Major parts of tourism information processes and transactions are handled electronically, leaving electronic traces of travel-related activities (searches, trip planning, reservations, feedback...). However, DMOs make limited use of these data (Höpken, Fuchs, Keil, & Lexhagen, 2011). Thus, several systems has been implemented to transform these data traces into valuable information for DMOs. For example, Fuchs, Höpken, and Lexhagen (2014), have developed a Big Data analytics framework to generate knowledge in Swedish DMOs.

Regarding analytics for gamified experiences, Yılmaz and Coşkun (2016) remark that implementation of gamification will contribute immensely to tourism businesses by providing data on consumer behaviour regarding tourism goods and services selection, especially when supplemented by data collected through mobile technologies and smartphones. Analytics are key tools when converting these data into valuable information for DMOs.

Recently, Conley and Donaldson (2015) analyse the process to be followed to measure the benefits of gamification from the beginning of each project, being analytics a key element when deploying gamification initiatives. Focusing on software tools, Heilbrunn, Herzig, and Schill (2014) present a theoretical model of 22 functional user requirements for gamification analytics tools in order to measure the success of gamification projects, to analyse user behaviour and to continuously improve gamification designs. Moreover, they also (Heilbrunn et al., 2014) identify relevant software solutions specifically targeting the gamification sector and evaluate them with their theoretical model, finding that neither of the solutions support more than nine of their requirements.

Nevertheless, most DMOs, specially small and medium sized ones, do not have access to the resources required to develop or integrate a Big Data framework or an analytics tool specifically targeting the gamification experience in their daily processes. In spite of that, these DMOs could use existing generic analytics tools to obtain relevant information about their digital initiatives, among them the gamified mobile experiences.

These generic analytics tools, such as Google Analytics (GA), present several advantages to replace log analysis systems as tools to obtain information about users (Clark, Nicholas, & Jamali, 2014). Additionally, they can generate Key Performance Indicators (KPIs) such as the number of visits, their duration or the return rate that can improve the analysis of the performance of tourism digital activities by DMOs (Moral et al., 2014).

For example, Rebón, Ocariz, Gerrikagoitia, and Alzua-Sorzabal (2015) rely on GA as the tool to analyse the behaviour of virtual visitors from BRIC countries (Brazil, China, India and Russia) to a Web portal of the DMO of Spain promoting the tourism brand of the country, extracting the interest of each section (where to go, practical information,...) and key theme (art, accommodation,...) for each market.

Focusing on gamified experiences, Kuo and Chuang (2016) measure the effect of a gamification initiative integrating both surveys and GA to measure its impact for online academic disseminations, based on the behaviour of users when accessing the platform. Similarly, Wolf, Mulholland, Maguire, and O'Donovan (2014) present a mobile storytelling experience based on scanning QR codes at museums that could resemble a tourism application. For its validation, they rely on analytics provided by GA about page access to identify how often visitors scanned QR codes and to what extent they were likely to follow the story once they had visited the online information about an artwork.

Previous examples show that analytics tools, such as GA, are powerful and cost effective tools that could be applied by DMOs to validate gamified experiences and to obtain data about the behaviour of tourists.

3 Research Objectives

As highlighted previously, on-site gamified experiences may include several potential benefits for DMOs. However, there are only few examples that measure the real impact of these experiences for DMOs. To address this research gap, this paper focuses on the validation of the following hypotheses:

H1: Gamified mobile experiences enrich the visiting experience of tourists

Gamified mobile experiences can enrich the visiting experience of tourists visiting a destination. They have the opportunity to discover the destination more deeply while enjoying the experience.

H2: Analytics tools provide relevant information from gamified mobile experiences for DMOs

The integration of analytics tools in gamified mobile experiences can provide DMOs with relevant information not only about the performance of these experiences but also about the behaviour of tourists in a cost effective way. Such information may offer DMOs and local service providers new insights about tourists and their behaviour while at the destination.

4 Gamified Mobile Experience

In order to assess the research hypotheses, a gamified mobile experience has been designed and tested in two local DMOs (Zarautz and Getaria) in the Basque Country with the support of the Regional Tourist Organization (RTO) (Basquetour, Basque Tourism Agency). The pilot gamification project has been divided into four phases, following the methodology proposed by Bedwell, Slack, and Greenhalgh (2015).

4.1 Definition of the Experience

Within the first phase, main features of the mobile experience have been defined. First, as families are supposed to be receptive to this type of gamified experiences where all of their members can collaborate, families with children visiting the towns in low season have been defined by DMOs as the target user profile for the validation.

The difficulty of the mini-games and the previous technological knowledge requirements should not be a barrier, thus simplicity should be taken into account during the rest of the phases. Regarding the languages, gamified mobile experience is available in four languages (Basque, Spanish, French and English) to reflect the major demographics of the visitors.

Regarding the overall workflow of the gamified mobile experience defined by DMOs, the experience proposes tourists to visit eight POIs, four from each municipality. DMOs have also defined the content (texts and images) describing the POIs and their destinations. Tourists can visit POIs in any order and POIs could have mini-games (questions or check-ins) associated. While questions are multiple choice questions, check-ins require to scan a QR code located at a visible position at the POIs. Finally, a validation of the GPS location of the tourist is required to check they are indeed close to the POI. Correctly answering questions and performing the check-ins give tourists points (one per POI). After gaining three out of eight points (threshold defined by DMOs based on the duration of a regular visit), tourists are shown a survey to evaluate whether the experience has been funny and easy to play, and to send further suggestions. When they send the survey, they obtain a code to redeem it for a real prize at the tourism information offices.

4.2 Development of the Technical Prototype

The gamified mobile experience has been developed by DMOs using the authoring tool described by Garcia et al. (2016). It starts with the selection of the language (Fig. 1a) and a short tutorial (Fig. 1b). Then, a list of the eight POIs is presented (Fig. 1c). Each POI has an icon (an eye) that represents whether it has been already

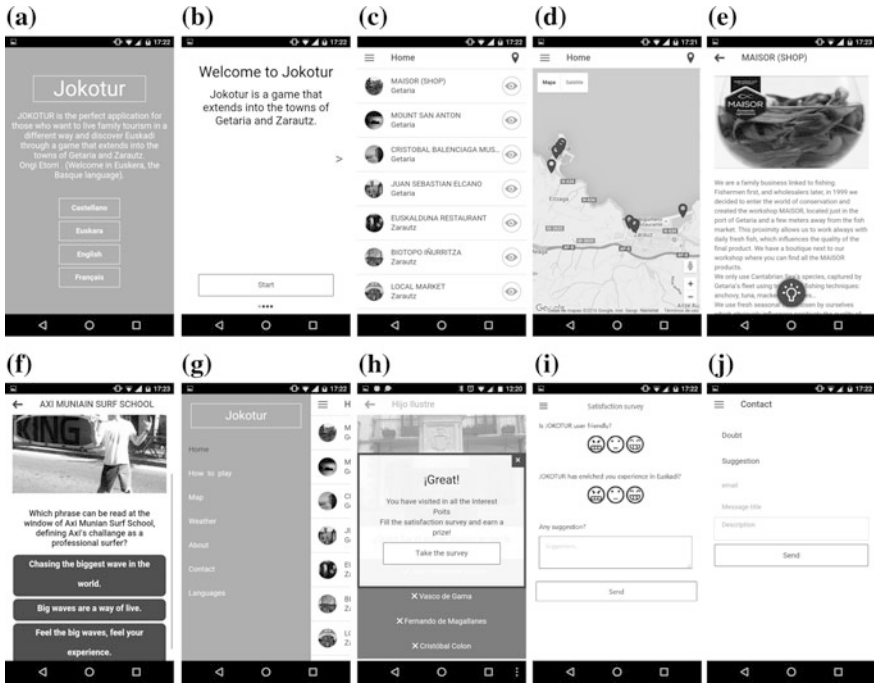


Fig. 1 Screenshots of the gamified mobile experience

visited or not. Selecting a POI shows its details (Fig. 1e) and allows accessing the corresponding mini-game (Fig. 1f). Tourists are informed whether they have successfully fulfilled it and the points left to win a prize. Once they reach this minimum amount of points (three) (Fig. 1h), they are presented a brief survey (Fig. 1i) about the experience and with the code they have to redeem at the tourism office.

Tourists can also select POIs from a map view (Fig. 1d), which shows their current location. Finally, using the main menu (Fig. 1g), it is possible to change the language; enter the tutorial again; consult the weather forecast; access information about the application and the pilot project; and contact the DMOs (Fig. 1f).

The experience relies on Google Analytics to transform the digital traces of tourists into valuable information for DMOs. The default tracking provided by GA has been extended with customised views and events. The former have been defined for each screen of the mobile application (POI, language, tutorial, weather...), while four types of event categories have been defined for the tracking: game, language, survey and contact. Within the game category, the following actions are tracked: check-in, to trace both a successful and unsuccessful check-in attempts; start, to trace the view of the last screen of the tutorial; correct and incorrect answers to question of POIs; new point gain by tourists; minimum amount of points to win a prize reached by tourists; and end of the experience, considered when submitting the survey after reaching the minimum amount of points. Within the language

category, the selection of each option (Basque, Spanish, English and French) is tracked in order to know the use of each one. Survey and contact events are only tracked when tourists perform these actions.

Finally, although it would be technically feasible to continuously track the GPS locations of tourists from the mobile application, this possibility has been discarded due to privacy concerns and negative impacts on the duration of the battery.

5 Validation of the Pilot Project

The validation of the pilot project has taken place from October 9th 2015 to the end of November 2015. Due to the validation nature of the pilot, a limited marketing campaign has been conducted, including a press conference where the three DMOs and the technology provider presented the initiative. The name of the gamified mobile experience has been Jokotur.

Besides the brand image of the pilot experience, leaflets and posters have been printed to describe the initiative and direct tourists through a near field communication (NFC) tag and a QR code to the download pages of Android Google Play and iOS App Store. In order to promote the consumption of local services, the leaflet (Fig. 2) also includes four coupons offering a one euro discount at four private businesses collaborating with the pilot project. The press conference has been reinforced with posts at the Web and the Facebook pages of the DMOs.

After these initial actions, Jokotur has been promoted only at the tourism offices of Zarautz and Getaria, presenting the initiative to families visiting the tourism offices. Finally, paint sets and books, cups, buffs and bags have been available at tourism offices as prizes for tourists gaining at least three points.

The mobile gamified experience has been available for download until the end of November 2015. After this period, the information gathered by the DMOs and GA have been the basis to analyse the results of the validation.



Fig. 2 Promotion leaflet of Jokotur

5.1 *Data from DMOs*

Staff from the tourism offices have been in charge of the promotion of the experience and the communication with tourists. Due to their workload, they have not been asked to perform additional tasks as interviews to a subset of tourists. For the same reason, it has not been possible to ask local service providers taking part in the validation to gather more information about tourists visiting them.

Although this has limited the amount of data provided by DMOs, it is a common situation for small and medium sized DMOs and tourism service providers. They do not have enough resources to deeper involve their staff in the measurement of the impact of this type of initiatives.

Regarding the acceptance of the application, 70% of the families visiting the tourism offices downloaded the mobile experience. 90% of the downloads were made through the QR code located at the posters of the offices. 22% of the downloads came from iOS devices and 78% from Android devices. Tourists considered the gamified mobile experience was easy to use (average of 2.85 out of 3 responding to the question “Is Jokotur user friendly?”); and it improved their visiting experience (average of 2.7 out of 3 responding to the question “Has Jokotur enriched your experience in Euskadi?”).

These results successfully validate the first hypothesis, so that it can be affirmed that gamified mobile experiences enrich the visiting experience of tourists. However, as Jokotur has targeted families with children, more studies are required in order to assure this hypothesis also applies to general tourists.

The small amount of information collected directly by DMOs strengthens the relevance of the integration of automatic measuring tools in the gamified experiences, such as GA, as a data source to analyse the impact of these mobile experiences. These analytics tools neither increase the burden on the staff of DMOs or local service providers, nor depend on them. Moreover, their integration costs during the development stage of the mobile experiences are not relevant; and their interface for DMOs to browse the information is user friendly.

5.2 *Data from Google Analytics (GA)*

Although the figures provided by GA may not be completely accurate, as is the case of Web pages analytics, they provide a solid insight about the gamified mobile experience.

Data gathered by default by GA already provide interesting information for the validation. During the validation period, 124 tourists used the application, generating 210 sessions and viewing 2.315 screens of the mobile experience. The average session duration was 6 min and 5 s.

The maximum number of active users within a day was 39. After this peak, the average active users during weekends reached an average value between 10 and 15

active users at the first half of the validation, and declined to 2–3 users by the end of the validation period, running within the low tourism season.

Focusing on demographic information of tourists, 82% of them had a mobile phone configured with Spanish as its main language, 12% of them English, 4% Catalanian, and 2% Basque. As the application was used at the destination, analysis of the country and city of the origin of data connections is not relevant, contrary to Web pages or digital experiences designed for the pre-trip phase of the travel experience.

After this initial insight, the data based on custom views and events provide more information for the validation. The most accessed screen was the home, with 1.129 views, followed by details about POIs (616 views), the tutorial (191 views), language (163 views), maps (134 views), weather (40 views), about (25 views), survey (24 views) and contact (20 views). Considering there were 124 unique users, by average each tourist consulted the details of 5 POIs.

The average viewing time was 36 s for each screen. However, tourists spent an average of 1 min and 33 s on the survey screen, 57 s on the POI screen and 53 s on the map screen. The contact page, with just 4 s of average stay, was the least used page of the application. For 28% of tourists, visiting the about screen was their last action before leaving the application, and 20.83% in the case of the survey screen.

As detailed on the previous section, the mobile experience tracked four categories of events: game, language, survey and contact. Tourists launched 883 events, being 85.16% of them related to game, 13.14% to language, 1.59% to survey, and just 0.11% to contact.

From the 752 events related to games, around 40% of them (320) were check-ins (196 correct and 124 failed), 12.9% start of the game after completing the tutorial, 11.57% incorrect answers, 9.84% correct answers, 8.64% new points, 7.58% prize won, and 3.46% end of the experience (survey submitted).

From the 115 events related to language selection, 78.26% change the language to Spanish, 15.65% to Basque, 4.35% to English and 1.74% to French. Thus, only seven tourists used the application in English (five) or French (two).

Within the event marking the submission of the survey, the POIs visited by tourists have been saved as labels of the events. Thus, it is possible to analyse the behaviour of these tourists. Only one out of 14 visited POIs both from Zarautz and Getaria. Although these data only include the tourists that have fulfilled the survey, data give a first insight about the interest of each POI.

The analysis of the information obtained from GA validates the last hypothesis, analytics tools provide relevant information from gamified mobile experiences for DMOs. Besides general information about number of users, devices, and origin of connections, the integration of custom views and events provides further insights on the on-site behaviour of tourists.

The integration of analytics tools on mobile applications is a cost effective opportunity for DMOs to better measure the impact of these applications and improve their knowledge about tourists. Moreover, based on analytics tools, custom KPIs measuring the performance of the experiences (Plaza, 2011) can be defined to ease the integration of this information on the decision processes of the DMOs. For

the pilot project four main KPIs have been defined to analyse its impact: the feedback of tourists (2.7/3), the number of tourists downloading experiences (124), the number of POIs visited globally (320) and per tourist (2.5/8), and the number of tourists getting enough points to get a prize (22%).

6 Conclusions

After a previous analysis of the capacity of DMOs to autonomously generate simplified gamified mobile experiences and their theoretical benefits (Garcia et al., 2016), this paper presents the results of the validation of a gamified mobile experience with real tourists for seven weeks, focusing on the data provided by the DMOs and an analytics tool (Google Analytics) integrated with the mobile application.

DMOs have obtained some interesting conclusions analysing the results of the validation. First, some KPIs have been defined to measure the impact of the experience: the feedback of tourists (2.7/3), the number of tourists downloading experiences (124), the number of POIs visited globally (320) and per tourist (2.5/8), and the number of tourists getting enough points to get a prize (22, 17.74%).

The validation has tackled the benefits of these types of experiences and has highlighted the relevance of gamified mobile experiences for DMOs and tourists. Moreover, DMOs have realised the relevant role that analytics tools such as Google Analytics can play as new information sources about the impact of tourism initiatives and the behaviour of tourists.

The experience has offered a better service to a niche tourism market, while enriching the visiting experience of tourists. Although not enough data have been available to assure it confidently, they also may increase the visiting duration of POIs and balance the distribution of tourists over the destination.

While the application of gamification and analytics tools by DMOs for the on-site phase of the trip is still at an early stage of development, the results of the validation show that there are opportunities both to increase the availability of gamified mobile tourism experiences, and to measure them using analytics tools to obtain information about the behaviour of tourists.

Thus, both researchers and industry players are encouraged to further work on gamified mobile experiences providing new services to tourists; and on analytics tools and KPIs that improve the measurement of their impact and extraction of information from tourists by DMOs.

Acknowledgements Authors would like to thank the Basque Government and the Provincial Council of Bizkaia for partially funding this project. Authors would also like to thank the staff of Basquetour and the tourist offices from Zarautz and Getaria for their help and participation on the validation, especially Idurre Ostolaza, who is responsible of the Innovation & Sustainability Unit in Basquetour, Basque Tourism Agency (Basque Government).

References

- Bedwell, B., Slack, P., & Greenhalgh, C. (2015). Learning from the experts: Enabling and studying DIY development of location-based visitor experiences. In *2015 ACM international joint conference on pervasive and ubiquitous computing* (pp. 755–766). Osaka, Japan: ACM.
- Buhalis, D., Wagner, R., & Kingdom, U. (2013). E-destinations: Global best practice in tourism technologies and applications. In L. Cantoni & Z. P. Xiang (Eds.), *Information and communication technologies in tourism 2013* (pp. 119–130). Springer.
- Clark, D., Nicholas, D., & Jamali, H. R. (2014). Evaluating information seeking and use in the changing virtual world: The emerging role of google analytics. *Learned Publishing*, 27(3), 185–194.
- Conley, K., & Donaldson, C. (2015). Gamification: The measurement of benefits. In T. Reiners & C. L. Wood (Eds.), *Gamification in education and business* (pp. 673–688). Springer International Publishing.
- Cramer, H., Ahmet, Z., Rost, M., & Holmquist, L. E. (2011). Gamification and location-sharing: Some emerging social conflicts. In *Proceedings of ACM CHI workshop on gamification* (pp. 30–33). ACM.
- Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness: Defining “gamification.” In *15th international academic MindTrek conference: Envisioning future media environments* (pp. 9–15). Tampere, Finland, New York: ACM.
- Fuchs, M., Höpken, W., & Lexhagen, M. (2014). Big data analytics for knowledge generation in tourism destinations—A case from Sweden. *Journal of Destination Marketing and Management*, 3(4), 198–209.
- Garcia, A., Linaza, M. T., Gutierrez, A., Garcia, E., & Ornes, I. (2016). Generation of gamified mobile experiences by DMOs. In A. Inversini & R. Schegg (Eds.), *Information and communication technologies in tourism 2016* (pp. 45–57). Springer International.
- Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does gamification work?—A literature review of empirical studies on gamification. In *47th Hawaii international conference on system sciences* (pp. 3025–3034). Hawaii: IEEE.
- Heilbrunn, B., Herzig, P., & Schill, A. (2014). Towards gamification analytics-requirements for monitoring and adapting gamification designs. In E. Plödereder, L. Grunske, E. Schneider, & D. Ull (Eds.), *44th annual meeting of the society for computer science, informatics 2014* (pp. 333–344). Stuttgart.
- Höpken, W., Fuchs, M., Keil, D., & Lexhagen, M. (2011). The knowledge destination—A customer information-based destination management information system. In R. Law, M. Fuchs, & F. Ricci (Eds.), *Information and communication technologies in tourism 2011* (pp. 417–429). Springer Vienna.
- Kuo, M. S., & Chuang, T. Y. (2016). How gamification motivates visits and engagement for online academic dissemination—An empirical study. *Computers in Human Behavior*, 55, 16–27.
- Lim, M. Y., Taylor, N. K., & Gallacher, S. M. (2015). SUMMIT: Supporting rural tourism with motivational intelligent technologies. In C. B. Westphall, J. L. Mauri, & P. Pochee (Eds.), *UBICOMM 2015: The ninth international conference on mobile ubiquitous computing, systems, services and technologies* (pp. 64–69). Nice, France.
- Moral, P., Gonzalez, P., & Plaza, B. (2014). Methodologies for monitoring website performance. *Online Information Review*, 38(4), 575–588.
- Negruşa, A., Toader, V., Sofică, A., Tutunea, M., & Rus, R. (2015). Exploring gamification techniques and applications for sustainable tourism. *Sustainability*, 7(8), 11160–11189.
- Nunes, M. D. O., & Mayer, V. F. (2014). Mobile technology, games and nature areas: The tourist perspective. *Tourism & Management Studies*, 10(1), 53–58.
- Peretta, (2014). Evaluating mobile applications for urban tourism. *Journal of Tourism, Culture and Territorial Development*, 1, 13–35.

- Plaza, B. (2011). Google analytics for measuring website performance. *Tourism Management*, 32(3), 477–481.
- Rebón, F., Ocariz, G., Gerrikagoitia, J. K., & Alzua-Sorzabal, A. (2015). Discovering insights within a blue ocean based on business intelligence. *Procedia Social and Behavioral Sciences*, 175, 66–74.
- Ryan, R., & Deci, E. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology*, 25(1), 54–67.
- Seaborn, K., & Fels, D. I. (2015). Gamification in theory and action: A survey. *International Journal of Human Computer Studies*, 74, 14–31.
- Sigala, M. (2015a). Gamification for crowdsourcing marketing practices: Applications and benefits in tourism. In F. J. Garrigos-Simon, I. Gil-Pechuán, & S. Estelles-Miguel (Eds.), *Advances in crowdsourcing* (pp. 129–145).
- Sigala, M. (2015b). The application and impact of gamification funware on trip planning and experiences: The case of TripAdvisor's funware. *Electronic Markets*, 25(3), 189–209.
- Stadler, D., & Bilgram, V. (2016). Gamification: Best practices in research and tourism. In I. G. Roman Egger, & D. Walcher (Eds.), *Open tourism* (pp. 363–370).
- Wolff, A., Mulholland, P., Maguire, M., & O'Donovan, D. (2014). Mobile technology to support coherent story telling across freely explored outdoor artworks. In *11th conference on advances in computer entertainment technology (ACE '14)*. Funchal, Portugal: ACM.
- Xu, F., Weber, J., & Buhalis, D. (2014). Gamification in tourism. In Z. Xiang & I. Tussyadiah (Eds.), *Information and communication technologies in tourism 2014* (pp. 525–537). Cham: Springer International Publishing.
- Xu, F., Tian, F., Buhalis, D., Weber, J., & Zhang, H. (2015). Tourists as mobile gamers: Gamification for tourism marketing. *Journal of Travel & Tourism Marketing*, 8408, 1–19.
- Yılmaz, H., & Coşkun, İ. O. (2016). New toy of marketing communication in tourism: Gamification. In E. Sezgin (Ed.), *e-Consumers in the era of new tourism* (pp. 53–71).