SPECIAL THEME

Smart technologies for personalized experiences: a case study in the hospitality domain

Barbara Neuhofer · Dimitrios Buhalis · Adele Ladkin

Abstract Recent advances in the field of technology have led to the emergence of innovative technological smart solutions providing unprecedented opportunities for application in the tourism and hospitality industry. With intensified competition in the tourism market place, it has become paramount for businesses to explore the potential of technologies, not only to optimize existing processes but facilitate the creation of more meaningful and personalized services and experiences. This study aims to bridge the current knowledge gap between smart technologies and experience personalization to understand how smart mobile technologies can facilitate personalized experiences in the context of the hospitality industry. By adopting a qualitative case study approach, this paper makes a two-fold contribution; it a) identifies the requirements of smart technologies for experience creation, including information aggregation, ubiquitous mobile connectedness and real time synchronization and b) highlights how smart technology integration can lead to two distinct levels of personalized tourism experiences. The paper concludes with the development of a model depicting the dynamic process of experience personalization and a discussion of the strategic implications for tourism and hospitality management and research.

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B. Neuhofer (✉) · D. Buhalis · A. Ladkin
Faculty of Management, Bournemouth University, Fern Barrow, Poole BH12 5BB, UK
e-mail: bneuhofer@bournemouth.ac.uk

D. Buhalis
e-mail: dbuhalis@bournemouth.ac.uk

A. Ladkin
e-mail: aladkin@bournemouth.ac.uk

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Introduction

Smart technologies have become pervasive in electronic markets across a number of areas, including the financial sector, retail and tourism (Alt and Klein 2011). Smart technology, implying the terms intelligent and smart, commonly refers to a product, condition or motion of a technology that entails a variety of functionalities that can be adapted to specific circumstances (Worden et al. 2003). With the advancement of society and industries and the proliferation of information and communication technologies (ICTs), smart technologies have received widespread interest in the tourism domain, despite its limited application to date. In recent years, technological developments have caused a transformation in that they have opened new opportunities for how tourism and hospitality experiences can be created (Tussyadiah and Fesenmaier 2009; Wang et al. 2012). Technologies are no longer only functional devices of everyday life but have evolved into integral tools enabling contemporary experience creation (Gretzel and Jamal 2009).

Recent Internet-based technologies, social networking tools and mobile technologies have allowed businesses and consumers to connect, interact and create experiences to an unprecedented scale. Particularly enforced by the new collaborative dimensions of technologies, the market place has undergone a shift towards consumers gaining increasing power and control (Alt and Klein 2011). With consumers playing a participatory role in the production and consumption process (Buhalis and Law 2008), it has become paramount for businesses to use technology to engage consumers in a more personal way (Pine and Gilmore 1999). In this vein, Gretzel (2011) highlights the potential of intelligent systems in tourism to meet tourists' personal and situational needs.

Yet, the understanding of how businesses can strategically integrate smart technologies to meet the rising consumer demands for experiences is limited (Gretzel and Jamal 2009). Recent work recognizes the potential of technologies for more personalized experiences, such as the role of smartphones for travel and the mediation of the tourism experience (Wang et al. 2012; Wang and Fesenmaier 2013), the use of context-aware mobile applications in tourism (Höpken et al. 2010), the use of high-tech for high-touch experiences (Neuhofer et al. 2013) and the adoption of mobile tour guides for personalized routes and location-relevant information (Schmidt-Rauch and Schwabe 2013). Besides a small number of studies, research exploring intelligent systems beyond technological perspectives remain however fairly scarce (Gretzel 2011). Based on this rationale, it is the aim of this study to bridge the gap between *smart technologies* and *experience personalization* to address the underlying research question of "*whether* and *how* smart technology can facilitate personalized experiences in the context of the tourism and hospitality domain". As its main contribution, the study develops an integrated model depicting the requirements and processes of smart mobile technology necessary for the creation of personalized experiences.

The paper first assesses the current literature on smart technologies and the creation of experiences in the tourism and hospitality domain. It then goes on to outline the research design of a qualitative case study approach, presents the research findings and develops an integrated process model. Finally, it highlights several critical managerial implications and discusses limitations and suggestions for further research.

Literature review

Smart technologies in tourism and hospitality domain

Definition of smart technologies

While the terms 'smart' and 'intelligent' have been commonly applied in theory and practice, there is a limited understanding of their meaning and differentiation. Smart technology, implying the word intelligent, commonly describes a new product, referring to the environment, condition or motion of technology that adapts to certain functions or is tailored to specific circumstances (Worden et al. 2003). Intelligent systems have been defined as systems with the two-fold ability to sense the environment and learn actions to achieve particular goals. In the context of tourism, intelligent systems have been framed as autonomous systems that anticipate user needs and encompass comprehensive and specific knowledge adaptable to consumer input (Gretzel 2011). Besides several attempts, the concept of smart technology remains scarcely conceptualized

beyond technological fields and definitions remain largely ambiguously defined (Lee 2012a).

With the increasing pervasiveness of technology throughout industries, the application of smart technologies has become a main focus of attention. Particularly due to the convergence of the offline and online world, smart technologies have created a new space for business opportunities in a number of sectors (Lee 2012a), including health home systems (Patsadu et al. 2012) retail store usage (Lee 2012b), urban governance (Himmelreich 2013), the context of design education (McCardle 2002) and energy monitoring in hotels (Rogerson and Sims 2012). In these contexts, smart technologies have been portrayed as instrumental tools with specific functionalities that add value in several ways. For instance, the implementation of QR codes can support consumers in retail settings (Lee 2012b), while the combination of sensors, tags, RFID, semantics and cloud computing is used in the establishment of a smart city (Komninos 2013). Beyond the health, energy, retail and public sectors, the concept of smart technologies has received increasing attention in tourism, as a dynamic domain characterized by constant need for innovation (Zach et al. 2010).

Technological developments in tourism

The tourism industry as a fast-growing market has always been at the forefront of technology (Sheldon 1997) and has shown interest in developing synergies between technology and tourism (Buhalis and Law 2008). Consequently, the technological advances of the past decades have shaped the ways in which the tourism industry operates (Buhalis 2003; Middleton et al. 2009). Businesses have undergone a major re-engineering of structures, processes and strategies to take advantage of the full potential offered by emerging ICTs (Wang et al. 2010). Technologies have become a driver determining the operations of tourism organizations (Buhalis 2003; Buhalis and Law 2008), a key element in the innovation of products, processes and management (Hjalager 2010) and an enabler of the attraction and retention of visitors (Werthner and Klein 1999). In essence, the plethora of ICTs enabled to reduce costs, increase the speed of transactions, provide customization, facilitate innovation and allow for new business models to develop (Buhalis and Jun 2011). More recently, the advent of the Web 2.0 and the range of social networking applications has implied even more drastic changes by turning the Internet into an immense space of empowered consumers, social interactions and collaboration (Sigala 2009; Gretzel and Jamal 2009; Poslad et al. 2001). In line with growth of consumer demands and the fast developments in the technology sector, businesses have sought to identify new ways to innovate by adopting smart technologies that facilitate experiences and meet the requirements of contemporary consumers in the tourism market place.

Evidence of smart technology in tourism

Recently emerged mobile solutions, such as location-based services (Neuhofer 2012), context-based services (Lamsfus et al. 2010) and augmented reality applications (Yovcheva et al. 2013) have been increasingly implemented to assist tourists with navigating, finding locations, retrieving information and making bookings and reservations. Through a range of hardware devices and software platforms and applications, businesses and consumers have become interconnected in the travel process, resulting in more meaningful interrelations and a convergence of people, technology and more personalized tourism experiences (Neuhofer et al. 2012).

A number of studies have showcased innovative solutions of smart technology application in tourism. For instance, CRUMPET, a system aiming to provide new information delivery and service integration, combines four main aspects of tourism: personalized services, 'smartware' with multi-agent technology, location-aware services and mobile data communication (Poslad et al. 2001). Additionally, several innovative destination management organizations (DMOs) have demonstrated the successful implementation of a range of smart technologies. For instance, the destination Seoul adopts a mix of ICTs, including a visitor website with an interactive map for pre-arrival information, Facebook and Twitter for customer engagement and a mobile application functioning as a city guide. Montreal offers an interactive video that takes tourists virtually through different destination experiences, while Las Vegas provides itinerary personalization and New Zealand presents an online interactive trip planner with customizable maps, price ranges and activities (Buhalis and Wagner 2013).

These are only a few examples that underline how tourists, empowered by smart technologies, are able to turn into connected and active participants in a technology enabled service environment (Gretzel et al. 2006; Andersson 2007). ICTs have been central in facilitating platforms of interaction between businesses and consumers (Hultkrantz 2002), through which dialogues occur (Buhalis and Licata 2002), personalization can be fostered and more meaningful experiences can potentially be created (Binkhorst and Den Dekker 2009). In exploiting these possibilities, tourists can be integrated throughout the entire value chain (Prahalad and Ramaswamy 2004) to customize a wide range of service encounters according to their contexts (Lamsfus et al. 2010), needs and personal preferences (Niininen et al. 2007).

Creation of tourism and hospitality experiences

Customer empowerment in experience creation

In recent years the discussion, conceptualisation and exploration of experiences has increased considerably. Consumers no longer seek to only purchase products and services but are in quest for experiences obtained through the consumption of products and services (Morgan et al. 2010). With the gradual commoditization of goods and services, the market has turned to the pursuit of experiences as a means of providing consumers with added value and fostering competitive advantage (Pine and Gilmore 1999). Particularly enforced by the advances of technology, a shift towards consumer-centric perspectives has been induced, in which consumers occupy the central role in both the co-creation and consumption of their experiences (Ritzer and Jurgenson 2010). Instead of receiving pre-designed experiences, consumers have become central actors that integrate their resources in the co-creation of experiences and value (Ramaswamy and Gouillart 2008; Vargo and Lusch 2008). ICTs have played a key role in advancing the relationship between producers and consumers (Shaw et al. 2011) and empowering consumers in the conjoint creation of their experiences (Ramaswamy and Gouillart 2008; Buhalis and Law 2008). Thus, the main question for businesses is how to strategically integrate smart technologies to allow for the co-creation of valuable consumer experiences.

Technology for personalized experience creation

For this process to occur, innovative mechanisms and tools are needed that allow businesses to facilitate the right customer service in the right space at the right time (Gonzalez et al. 2004). To enhance the level of personalization, a constant evaluation of consumers, and their inherent preferences, while interacting in a service particular context is required (Gupta and Vajic 2000). This means that it is critical to collect, evaluate and respond to relevant information concerning consumer needs and preferences. A number of studies underline the role of ICTs in this process. For instance, ICTs enable extended business to customer (B2C) interactions (Buhalis and Law 2008; Egger and Buhalis 2008) and allow for the collection of information in an unobtrusive and cost-effective way (Raento et al. 2009). When strategically implemented, Piccoli et al. (2003) claim that companies can use ICTs to collect, consolidate, manipulate and analyze consumer needs on an unparalleled scale to maximise tailor-made experiences.

Experiences in the tourism and hospitality domain

Experiences have constituted an important concept in both tourism production and research for more than five decades (Uriely 2005). In fact, the creation of positive experiences has been described as the very essence of the hospitality industry (Pizam 2010). While diverse factors, such as location and price might provide significant criteria in the selection of a hotel, *experience* constitutes the key factor determining the choice of a hotel (Barsky and Nash 2010). As such, Tung and Ritchie (2011, p. 1369) highlight the need to "facilitate the development of an environment (i.e., the destination) that

enhances the likelihood that tourists can create their own memorable tourism experiences". The implementation of smart technology solutions can become a potential catalyst of change that turns standardized services into personalized experiences based on the tenet of 'treating different consumers differently' (Piccoli et al. 2003). In this vein, van Limburg (2012) urges tourism businesses to embrace ICTs for experience personalization, despite the fact that it is still limited in practice. It is with this premise in mind that this research explores the implementation of smart technology for the creation of personalized experiences in tourism and hospitality.

Research design

A qualitative case study approach was employed to develop a comprehensive understanding of smart technologies for the creation of personalized experiences. The choice of a case study methodology has been determined as critical to examining leading best practice cases of the industry (Binkhorst and Den Dekker 2009). Whilst 'best practice' generally represents a vague term, it has become frequently used in the business context to describe leading industry cases as role models to increase success (Hallencreutz and Turner 2011). Given the scarce practical, and in turn theoretical, knowledge about businesses implementing technology for experience creation to date (Tussyadiah and Fesenmaier 2007), the adoption of a case study was decisive to gather the necessary practice insights, explore and explain current practices and address the research problem at hand.

The case study was selected based on two main pre-defined criteria. First, the company had to be embedded in the tourism and hospitality context and second, it had to represent a best practice example by providing evidence for the current successful realization of technology-enhanced experiences. The Hotel Lugano Dante with its unique HGRM platform was selected as a best-practice case based on a number of factors underlining its far-reaching recognition in the tourism industry. Among the most recent acknowledgements, it has been awarded for its customer excellence at the ENTER 2012 Conference and it has received two TripAdvisor Traveller's Choice 2013 awards recognising the hotel among the number five hotels in Switzerland overall and number one hotel in Switzerland for service excellence.

Following the principles of case study research, the core focus was on the "process rather than outcomes, in context rather than a specific variable, in discovery rather than confirmation" (Merriam 1998, p. 19). In order to develop a comprehensive understanding, a mix of qualitative methods drawing from multiple sources of evidence was employed (Yin 2003). The threefold methodology consisted of documentary material, informal interviews and consumer online reviews. First, an assessment of documentary material was conducted, including company background information, presentation slides and written notes from a presentation held at a dedicated workshop on the topic of technology and experiences, to understand the practical processes underpinning the technological solution and its use. Second, an unstructured interview lasting approximately 1 h was conducted with a management representative of the hotel to gather insights into the company's role, philosophy and principles supporting the development of the smart technology. Third, an examination of online consumer reviews on the platform TripAdvisor was performed in April 2012 to capture consumer evaluations of their personalized experiences. This threefold data collection process allowed for a triangulation of the findings, which enhanced the construct validity and allowed for the development of a comprehensive understanding of the smart technology and experience creation processes in the context of use.

Findings and discussion

This section presents the findings of the hospitality case study. First, the analysis provides an organizational outline of the case study. Second, it reveals the technological requirements of smart technology for personalized experience creation and third, it conceptually differentiates two main levels of personalized tourism experiences.

Smart hospitality case study - organizational outline

The Hotel Lugano Dante is a 4 star hotel located in the city centre of Lugano, Switzerland, comprising a total of 83 rooms and 42 employees, leading to a total amount of 750,000 individual consumer interactions per year. The smart technology under investigation is the HGRM - Happy Guest Relationship Management system. In terms of the technological mechanisms, the HGRM system essentially constitutes a comprehensive customer relationship management (CRM) database, which functions as a meta-platform that combines several hotel operation systems. It merges the data received from the property management system (PMS) Fidelio, outlook, the guest's intranet site MyPage and all operations platforms into one database. By doing so, the HGRM provides a centralized solution that unifies all internal and external information exchanges, transfers and interactions among the hotel staff and between the hotel and its guests. As the system covers processes of the entire customer journey, i.e., pre-arrival, in-house and post-departure stage, it encompasses a myriad of service encounters, also referred to as touch-points, which are presented in their chronological order next.

First, in the pre-arrival stage guests receive an invitation upon confirmation to access their personalized guest website (MyPage). From this point onwards they are given a choice of whether or not they desire to personalize their stay. In case

guests are willing to share personal information in exchange for experience personalization, they can independently manage their MyPage website to communicate with the hotel, virtually meet the team and engage with hotel employees, manage details of their stay and select personal preferences. These include, for instance, the customization of room temperatures and bed, extra soft towels, organic bathroom sets, air cleaner, drinks and snacks in the mini-bar, special equipment for children, or the selection of the favourite newspaper.

Second, once the guest arrives at the hotel, a vast number of touch points are encountered in the different departments of the hotel, including the reception, housekeeping, restaurant, maintenance, bar, marketing, welcome, garage and parking. At these encounters, the hotel (and its individual employees) and the customer (the individual guest), interact for service experiences to be co-created (B2C). In adopting an employee-centric approach, each employee is empowered, equipped and instructed to access and use the HGRM smart technology platform through dedicated mobile devices. In the service delivery process, the HGRM enables employees to retrieve guest names and profiles, service and communication history, room status and personal preferences. By doing so, they are able to retrieve, modify and add up-to-date guest information obtained through one service encounter, which is instantly synchronized to all departments from one encounter to the next. In order to offer a detailed technological and practical understanding of the technology, Fig. 1 demonstrates a screenshot of the HGRM interface in use. It depicts guest room numbers and names together with the current room status, any special preferences, real-time message alerts, such as luggage transfer and the guest's current location in the hotel.

In managing all service encounters on this integrated platform, employees are in full control to see what is happening and what action is required to turn a *simple service routine* into a *personalized guest experience* by proactively anticipating as well as dynamically responding to the emerging needs and preferences of the guest.

Third, in the post-departure stage, guests are sent a welcome-home message through their MyPage website, which includes a personalized thank-you note, a picture of the employee who has performed the check-out, a contact email address for concerns and an invitation to leave a review on TripAdvisor. While in this stage no further personal information is collected, the principal purpose of this stage is to maintain the established relationship, reflect on the experience and keep the personal dialogue on going on social media platforms.

Requirements of smart technologies for personalized experiences

In order to develop the foundations for a practical and theoretical understanding of personalized experience creation it is critical to analyze the technological prerequisites of smart technologies. The general goal of smart technologies is to assess the environment and facilitate processes to be conducted in smarter, more efficient, useful and effective manner. By using smart technologies in tourism, the ultimate goal is to enhance experiences, generate added value and increase competitiveness (Neuhofer et al. 2012). The following section outlines how the HGRM platform functions as an integral tool of the overall experience co-creation and facilitation process.

Fig. 1 HGRM platform cockpit.
Source: Hotel Lugano Dante
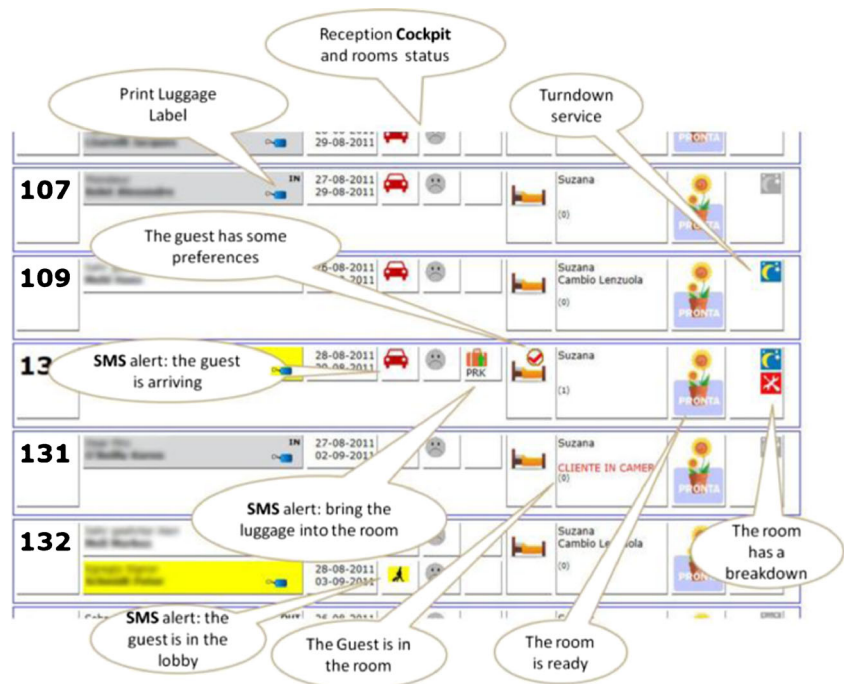
The qualitative analysis revealed the presence of three main technological requirements, which include a) information aggregation, b) ubiquitous mobile connectedness, and c) real time synchronization of information. These are graphically highlighted in Fig. 2 and discussed next.

1. Information aggregation

The systematic aggregation of consumer information to facilitate service personalization is paramount (Shen and Ball 2009). The findings reveal that the Hotel Lugano Dante allows for the exchange of information throughout the entire service chain, prior to the guests' arrival, during the hotel-stay and in the post-departure stage. The need for consistent information collection is in line with previous studies confirming the value to gather information in all stages, before, during and after the travel (Buhalis and Law 2008). The contact prior to the guest's arrival proves to be critical to gather a-priori information through the guests' MyPage site. This website primarily serves the purpose of establishing initial contact, engaging and collecting information about special needs, requirements and preferences. In this stage, information is gathered from consumers and stored in the company's central HGRM database platform (C2B). According to the Hotel Lugano Dante, a-priori information aggregation is indispensable for preparing a personalized experience on-site. At the same time, it appears that consumers value the possibility to state their preferences prior to the stay: "*You can pick your preferences amongst many choices: pillows, sheets, heating system, car parking, extra towels and stuff like that. This is UNIQUE*" (Consumer Review TripAdvisor).

While privacy of personal information constitutes a major concern in personalization which needs to be treated with the necessary care (Shen and Ball 2009), the findings reveal that consumers are generally willing to share personal information if it leads to better services being provided. The findings further underline that information collection is a prerequisite not only to co-create better experiences, but add further value in developing more personal relationships, making guests feel special, anticipating their needs to facilitate multiple valuable service encounters during the guests' entire stay. HGRM thus represents a solution that collects information, after asking permission, and uses that specific information to create guest experiences in a meaningful way. What renders the HGRM a smart technology is that it enables to

aggregate, store and update information on one centralized platform that can be accessed, situation-specific, by all employees to personalize experiences on the spot.

2. Ubiquitous mobile connectedness

In the hospitality environment, numerous human encounters and service transactions take place. The case study indicates that such encounters occur throughout a variety of departments, comprising reservations, reception, housekeeping, breakfast, maintenance, bar, marketing, welcome, sales, and revenue. According to the Hotel Lugano Dante, the number of encounters in their hotel amounts up to 750,000 single interactions per year. Given the complexity and interdependence of departments, employees and guests, one key requirement of smart technology is the factor *mobility*. This means that the technology needs to be portable, mobile and accessible for the service delivery by anyone, anywhere and at anytime.

The HGRM represents a solution that facilitates such encounters due to one of its core features, namely its ubiquitous mobile connectedness. As all employees are equipped with a portable device (iPads and iPhones), they are constantly interconnected and can access guest information through the HGRM cockpit at a single glance. It allows them to communicate, retrieve existing information as well as modify, add and upload new information at the moment of the encounter, on the move. Due to its mobile nature, experience facilitation is no longer restricted to static desktop access (e.g., restricted to the reception counter), but can be performed ubiquitously in the hotel according to the guest's location.

For instance, such encounters include welcoming guests at the reception, greeting guests by their names in the lobby, finding them a table in the restaurant, delivering their preferred newspaper or serving their favorite drink at the bar. The HGRM thereby allows for two core functionalities, mobility of the technology itself and mobile connectedness of the hotel and its individual employees. The importance of these features are in line with latest studies, testifying the opportunities of mobile solutions and their exploitation for service delivery, particularly as mobile access and wireless become more common (Schmidt-Rauch and Schwabe 2013). In fact, always-on connectivity enables enormous opportunities to enable interactivity and provide personalized, contextualized, and location based services (Buhalis and Law 2008). Mobility and ubiquitous connectedness hence constitute key prerequisites in the

Fig. 2 Requirements smart technologies for personalized experiences

1 Information aggregation	→	2 Ubiquitous mobile connectedness	→	3 Real time synchronization of information
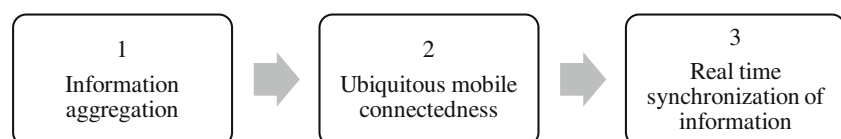
creation of personalized experiences as to allow employees to a) retrieve, access and facilitate guest needs along multiple service touch points and b) dynamically address these in the right place and at the right time on the move.

3. Real time synchronization of information

The HGRM platform can be accessed through multiple computers and mobile devices that function as a cockpit for employees to aggregate information throughout every department. For instance, while one employee can manage the guest's room status (ready or not), someone else can locate the guest (in the room, lobby, restaurant), transfer the luggage (to lobby or room) or manage guest arrivals and requests (at the reception) at the same time. By being connected not only to mobile, but most importantly, synchronized cockpits at all times, information can be exchanged among employees in real time. Thereby, the smart technology features two main functionalities, namely a) the adaptation of existing information based on changing needs and b) the addition of incoming needs and preferences on the spot.

This has critical implications on the way consumer experiences can be created. Experiences are no longer static and pre-designed in advance by the hotel provider, but are dynamically co-created and personalized between guests and employees at the service encounter in real time. The essential prerequisite for smart technology is real time synchronization, which implies drastic changes as to how information is processed. Information is not limited to a-priori collection but can be collected and updated at the face-to-face encounter in real time. For the tourism and hospitality context, this means that dynamic timing for an agile and flexible service delivery can become a key factor for competitiveness (Rust and Oliver 2000). In fact, in their work about technology-mediated personalization, Shen and Ball (2009) point out that continuity personalization is one of the areas offering most potential for the future, albeit not being an easy endeavor to realize in practice. The findings of the case study demonstrate that the HGRM platform allows for dynamic data aggregation and real time synchronization, which in turn permits 'continuity personalization' through continuous learning processes of guest information at all times.

In order to provide a detailed practical overview of how smart technology facilitate personalized experiences, Table 1 has been developed. Based on common HGRM service scenarios, it presents a comparison of experience creation processes between non-technology versus smart technology use to underline the differences in the experience creation while adopting a smart technology solution.

Table 1 Smart technology processes comparison

Smart technology processes comparison

Experience creation scenario	Non-technology (old)	Smart technology (new)
Scenario: room comfort	Standardized and uniform room settings	Individualized room settings to personal preferences prior to the arrival Dynamic update of preferences during the stay Dynamic update of observations by employees
Scenario: welcome encounter	Standardized, mass or anonymous encounter	Individualized welcome by guest name Welcomed by familiar faces already introduced on MyPage prior to the guest's arrival
Scenario: restaurant visit	Standardized service, table, name and room	Personalized welcome and greeting by name Personal F&B preferences are known Dynamic update of preferences and favorite consumption in F&B outlets during the stay

Personalized tourism experiences

The significance of the concept of personalization has been widely acknowledged by recent studies discussing personalized mobile services for tourism (Poslad et al. 2001), mobile tour guides for personalized routes (Schmidt-Rauch and Schwabe 2013), user personalized destination marketing (Matloka and Buhalis 2010) or technology-mediated personalization (Shen and Ball 2009). The findings of the case study conform with previous research, which suggests that ICTs can foster richer (Tussyadiah and Fesenmaier 2007) and more personalized experiences (Sandström et al. 2008). The findings of the case study also move beyond existing studies in that they reveal that in addition to personalization, in the sense of customization, a personalized experience is also characterized by a high level of personal, one-to-one human interrelations. Accordingly, this study proposes to distinguish two levels of personalized experiences, a) personalization (customization) of experiences and b) personalized consumer-employee interactions, as outlined below.

1. Personalized services and experiences

Consistent with previous research, personalization of products and services addressing consumer needs represents a key concept (Shen and Ball 2009). What matters is the "accumulation of knowledge about a consumer's needs and the utilization of that knowledge" in order to deliver high customer satisfaction (Niininen et al. 2007, p.267). The case study sheds light on this very approach

is achieved by collecting need information based on which more personalized experiences are created. With respect to customer satisfaction, the findings reveal that the implementation of the HGRM platform enables the hotel to achieve all key performance indicators, including that the reservation was accurate, the check-in took less than 5 min and no issues throughout the stay or billing errors occurred (Cornell Hospitality Industry Perspectives 2010). In addition, through the use of the HGRM, the experience was enhanced, as guests felt recognized and treated in a personal and unique way. From a consumer perspective, this has led to several experience outcomes, including perceived added value, exceeding of guest expectations, positive feedback, customer loyalty, repeat visitation and increased advocacy through word-of-mouth and personal recommendation. A number of guest reviews from TripAdvisor confirm the perceived value of and satisfaction with their personalized experiences:

We were happy with the service even before we arrived, as they allow us to choose, through an email sent to us a day before the trip, many elements of our stay, from the kind of pillows we wanted to what sort of beverages we would appreciate in our minibar (Review TripAdvisor). Another guest adds: "You can setup your room before arrival. It's really pleasant to feel like home each time we are there" (Consumer Review TripAdvisor).

This is in line with studies reporting that consumer profiling is crucial to lead to personalization and customization (Niininen et al. 2007). For that to happen, businesses need integrated systems to record customer and employee input at the same time. The HGRM case study represents a prime example of contemporary experience creation through smart technologies that allow for information collection, mobility and synchronization in order to shift from static to more dynamic processes of personalization.

2. Personalized interactions (E2C)

While the concept of experience personalization has been acknowledged in the past (Schmidt-Belz et al. 2002; Gonzalez et al. 2004), the findings provide evidence for a further level of personalization in the hospitality context. By adopting smart technologies, such as the HGRM, personalization goes beyond service customization in that it is realized through personal and meaningful interactions alike. Shen and Ball (2009) confirm that, if well conducted, one-to-one personalization provides a beneficial tool for customer relationship management. The personal recognition of consumers at every single service encounter is at the core of this concept. Consumer views commonly emphasize the appreciation of this level of personalization:

"The little details of addressing us by our names when we asked questions at the front desk showed that this hotel cared about its customers" (TripAdvisor Review). "As soon as you get there, they will call you for your exact name: Mr. Jones here, Mr. Jones there, like you were the only guest of the hotel… This also makes a difference" (TripAdvisor Review).

Smart technologies can assist in personal encounters and make consumers feel recognized in their experiences. Additionally, the study reveals that pre-stay and post-stay, the HGRM platform facilitates personal relations through the guest's MyPage website, where contact is established, employees are introduced and the setting for long-lasting relationships is built. Guests receive information about the employees, including names, job positions and pictures, which enable them to anticipate and familiarize with the people performing the first encounter at the check-in upon arrival. This feature reduces the anonymity of conventional service provision and places the focus on meaningful one-to-one relationships.

While marketing increasingly shifts towards one-to-one ICT-facilitated practices, focusing on the individual consumer (Niininen et al. 2007), the role of single employees, as the central actors in experience creation has been under researched to date. Most recent to date has analyzed ICTs facilitated interactions, including business-to-business (B2B), consumer-to-consumer (C2C) (Wang et al. 2000) and business-to-consumer (B2C) interactions (Buhalis and Law 2008; Egger and Buhalis 2008). Going beyond these traditional relations, this case study recognizes the technology-facilitated interaction between *employees* and *consumers* as a key process in the personalization of the service delivery. As a result, the experience co-creation process is shifted from a company-central level (B2C) to the individuals who create meaningful employee-consumer (E2C) interactions.

The priority for companies thus is to empower their employees as the main actors in a more personalized, engaging and human experience encounter. In fact, the notion of one-to-one interactions corroborates with recent scholars proposing a revival of the social component in electronic markets, as consumers and other members of the society are regaining control (Alt and Klein 2011). This study points towards the empowerment, not only of consumers but also employees as co-creating actors of personalized experiences. The goal of personalization is thus a two-fold process of a) customization of experiences and b) one-to-one interactions that are facilitated by the support of mobile, dynamic and smart technologies.

Smart technologies for personalized experiences

The case study demonstrates that the implementation of a smart technology is critical for the co-creation of personalized

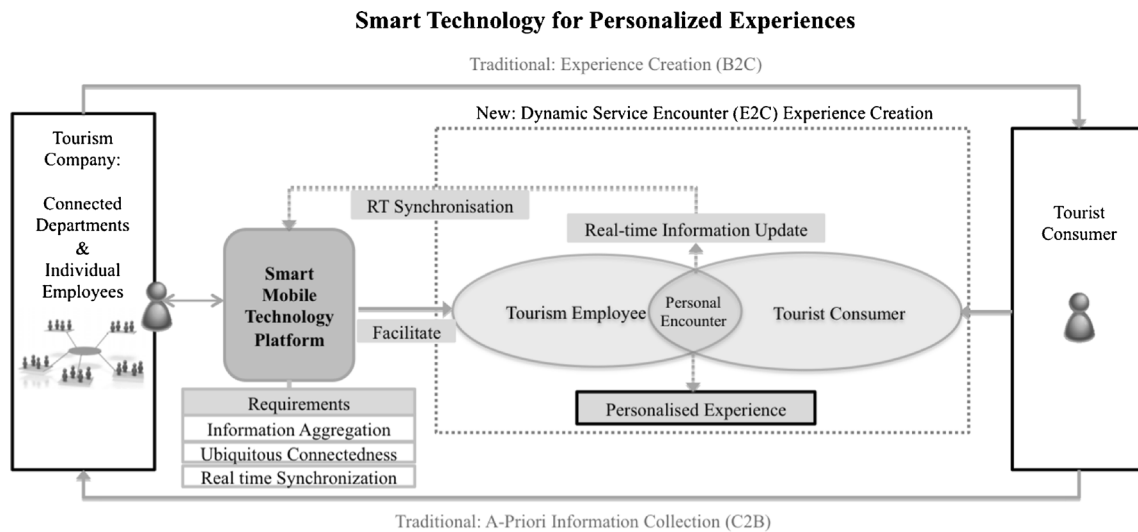**Smart Technology for Personalized Experiences**

Fig. 3 Process model personalized experience creation

experiences between the hotel (and its employees) and the tourist consumer in the hospitality and tourism industry. To depict the processes explained above, a process model of 'Personalized Experience Creation' was developed in Fig. 3.

The model displays the requirements and processes of smart technologies necessary for personalized experiences to be facilitated. In contrast to traditional static a-priori information collection from the consumer to the company (C2B) and the one-way experience delivery from the company to the consumer (B2C), smart technologies have opened more dynamic service encounters, in which experiences are co-created in an agile manner. Moreover, experience creation, facilitated by technology, occurs on a micro employee-consumer (E2C) level. In that employees in various departments are interconnected to real-time information, employees and consumers enter a dynamic service encounter in which a) personalized experiences are created and b) information can be collected and synchronized for future encounters.

To allow for this process to occur, the mode highlights that smart technologies need to fulfil three main requirements. First, the platform needs to allow for information to be dynamically collected and adjusted on a continuous level. Second, mobile technologies with ubiquitous connection are needed to facilitate service encounters along all touch points throughout the hotel setting, by anyone, anywhere and at any time. Third, the smart technology needs to allow for information to be updated, uploaded and synchronized on a real-time basis. By fulfilling these features, smart technology solutions can help employees to dynamically anticipate and address consumer needs along every step of the journey.

In this respect, it is however noteworthy to point out underlying issues emerging from the case study. While numerous benefits of technology for personalization are outlined, it is critical for businesses to handle personalization with the

necessary care. This is in line with studies confirming concerns regarding the privacy of information collection and retention (Shen and Ball 2009), the level of consumer integration as resource integrators in experience co-creation (Baron and Harris 2008) and the potential risk of overuse and over-visibility of technology in the service encounter (Benckendorff et al. 2005). In taking these issues into account, businesses can reflect on the ideal level of consumer and technology integration in order to facilitate the ideal personalized experience *for* and *with* the tourist consumer.

Conclusions and implications

The integration of smart technologies for the creation of personalized experiences is critical for businesses to remain competitive in today's dynamic market place. This is of particular interest to the tourism and hospitality industry, in which commoditization, competition and high customer expectations drive the need for differentiation (Peterson 2011). With increasing opportunities brought by the developments in the mobile electronic market, customer service and experience personalization have become possible to unparalleled levels. The study has aimed to bridge the current gap between smart technology and personalized experiences and contributed to the theoretical understanding on three main levels. It has a) developed knowledge about the key requirements of smart technology, b) differentiated two main levels of personalized experiences, and c) presented an integrated model that paints the picture of the underlying processes that occur when personalized experiences are created through smart technology.

With respect to management and practice, this study has explored whether at all, and how smart technology can be used to create personalized experiences in the context of the tourism and hospitality industry. The findings of the case study have

several critical implications that apply to the general use of ICTs for consumer experience creation. Smart technologies can function as a catalyst of change that can assist in the facilitation of dynamic service encounters, agile consumer profiling and experience co-creation practices that are equally shared between companies and consumers. The findings suggest that businesses need to the exploit emerging smart technologies and implement them in the entire strategy and operation structures of the service setting. Thereby, technologies will not substitute personal human encounters. Rather, they serve as instruments to strategically improve human resource-led processes by equipping individual employees with technology for an enhanced service and experience creation process. Smart technologies thus need to be regarded as key tools, which context-dependent, can be operated in the background and foreground to foster engagement and enhance the possibilities of personalized experience creation. This has particularly crucial implications for tourism, which is highly dependent on the successful creation of personal experiences to reduce the interchangeability of the tourism product and increase competitive advantage by facilitating higher value extraction for the consumer.

Beyond the theoretical and practical implications, several limitations are acknowledged which could potentially be addressed in further research. The case study could be expanded in that multiple cases in addition the single case study are examined. This would allow for a comprehensive cross-case analysis, validation and generalisation of the findings to a larger industry context. As the findings are based on one case study in the hospitality domain, this research does not try to claim generalisability beyond the immediate context of the study. Additional in-depth studies could focus on the emerged relational role of employee-consumer interactions to illuminate the interdependence between employee empowerment, technology and experience co-creation practices. Moreover, with the dynamic emergence of smart technologies in tourism, this stream of research is only in its infancy. Further exploration is needed to capture the adoption, implementation and impact of smart technological solutions in the coming years. Particularly as new smart technologies in the areas of location-based services, augmented reality, context based services and gamification emerge, research in this domain could be accelerated opening a broad agenda for future research in hospitality, tourism and beyond.

References

Alt, R., & Klein, S. (2011). Twenty years of electronic markets research-looking backwards towards the future. *Electronic Markets The International Journal on Networked Business, 21*(1), 41–51.

Andersson, T. D. (2007). The tourist in the experience economy. *Scandinavian Journal of Hospitality and Tourism, 7*(1), 46–58.

Baron, S., & Harris, K. (2008). Consumers as resource integrators. *Journal of Marketing Management, 24*(1–2), 113–130.

Barsky, J. & Nash, L. (2010). *What is more important than location in selecting a hotel?* Retrieved from http://www.marketmetrix.com/en/default.aspx?s=research&p=MoreImportantThanLocation.

Benckendorff, P., Moscardo, G., & Murphy, L. (2005). High tech versus high touch: visitor responses to the use of technology in tourist attractions. *Tourism Recreation Research, 30*(3), 37–47.

Binkhorst, E., & Den Dekker, T. (2009). Agenda for co-creation tourism experience research. *Journal of Hospitality Marketing & Management, 18*(2/3), 311–327.

Buhalis, D. (2003). *Etourism: Information technology for strategic tourism management.* Harlow: Prentice Hall.

Buhalis, D. & Jun, S.H. (2011). E-tourism. *Contemporary Tourism Reviews.* Retrieved from http://www.goodfellowpublishers.com/free_files/fileEtourism.pdf.

Buhalis, D., & Law, R. (2008). Progress in information technology and tourism management. 20 years on and 10 years after the internet. The state of etourism research. *Tourism Management, 29*(4), 609–623.

Buhalis, D., & Licata, M. C. (2002). The future etourism intermediaries. *Tourism Management, 23*(3), 207–220.

Buhalis, D., & Wagner, R. (2013). E-destinations: Global best practice in tourism technologies and application. In L. Cantoni & X. Xiang (Eds.), *Information and communication technologies in tourism 2012* (pp. 119–130). Vienna: Springer Verlag.

Cornell Hospitality Industry Perspectives (2010). *Making Customer Satisfaction Pay: Connecting Survey Data to Financial Outcomes in the Hotel Industry.* 5 (July 2010). Retrieved from: http://www.hotelschool.cornell.edu/research/chr/pubs/perspective/.

Egger, R., & Buhalis, D. (2008). *Etourism case studies: Management and marketing issues.* Burlington: Elsevier Ltd.

Gonzalez, G., Lopez, B., & De la Rosa, J. L. (2004). Smart user models for tourism a holistic approach for personalized tourism services. *Information Technology & Tourism, 6,* 273–286.

Gretzel, U. (2011). Intelligent systems in tourism: a social science perspective. *Annals of Tourism Research, 38*(3), 757–779.

Gretzel, U., & Jamal, T. (2009). Conceptualizing the creative tourist class: technology, mobility, and tourism experiences. *Tourism Analysis, 14*(4), 471–481.

Gretzel, U., Fesenmaier, D. R., & O'Leary, J. T. (2006). The transformation of consumer behaviour. In D. Buhalis & C. Costa (Eds.), *Tourism business frontiers: Consumers, products and industry* (pp. 9–18). Oxford: Elsevier.

Gupta, S., & Vajic, M. (2000). *The contextual and dialectical nature of experiences.* California: Thousand Oaks.

Hallencreutz, J., & Turner, D. M. (2011). Exploring organizational change best practice: Are there any clear-cut models and definitions? *International Journal of Quality and Service Sciences, 3*(1), 60–68.

Himmelreich, J. (2013). Good urban governance and smart technologies: A german city as a best practice case of e-government. In K. B. Akhilesh (Ed.), *Emerging dimensions of technology management,* (pp. 55–61): Springer India.

Hjalager, A.-M. (2010). A review of innovation research in tourism. *Tourism Management, 31*(1), 1–12.

Höpken, W., Fuchs, M., Zanker, M., & Beer, T. (2010). Context-based adaptation of mobile applications in tourism. *Information Technology and Tourism, 12*(2), 175–195.

Hultkrantz, L. (2002). Will there be a unified wireless marketplace for tourism? *Current Issues in Tourism, 5*(2), 149–161.

Komninos, N. (2013). Smart Cities and the Future Internet: Innovation ecosystems of embedded spatial intelligence, ICEIRD 2013 Conference Proceedings. *2013-ICEIRD-Smart Cities and the Future Internet.*

Lamsfus, C., Grün, C., Alzua-Sorzabal, A. & Werthner, H. (2010). Context-based matchmaking to enhance tourists' experience. *Journal for the Informatics Professional, CEPIS-Upgrade Journal,* 203.

Lee, H. J. (2012a). A review of value creating motive and business model in smart technology. In Y. H. Park, Q. Jin, M. S. Yeo, & B. Hu (Eds.), *Human centric technology and service in smart space* (Vol. 182, pp. 159–163). Dordrecht: Springer Verlag.

Lee, H.J. (2012b). A study on the promotion of the business service for regional retail store using smart technology. *Personal and Ubiquitous Computing, July 2012*.

Matloka, J., & Buhalis, D. (2010). Destination marketing through user personalized content. In U. Gretzel, R. Law, & M. Fuchs (Eds.), *Information and communication technologies in tourism 2010* (pp. 519–530). Vienna: Springer Verlag.

McCardle, J. R. (2002). The challenge of integrating ai & smart technology in design education. *International Journal of Technology and Design Education, 12*(1), 59–76.

Merriam, S. B. (1998). *Qualitative research and case studies applications in education*. San Francisco: Jossey-Bass Publications.

Middleton, V. T. C., Fyall, A., Morgan, M., & Ranchhod, A. (2009). *Marketing in travel and tourism* (4th ed.). Oxford: Butterworth-Heinemann.

Morgan, M., Lugosi, P., & Ritchie, J. R. B. (2010). *The tourism and leisure experience: Consumer and managerial perspectives*. Bristol: Channel View.

Neuhofer, B. (2012). An analysis of the perceived value of touristic location based services. In M. Fuchs, F. Ricci, & L. Cantoni (Eds.), *Information and communication technologies in tourism 2012* (pp. 84–95). Vienna: Springer Verlag.

Neuhofer, B., Buhalis, D., & Ladkin, A. (2012). Conceptualising technology enhanced destination experiences. *Journal of Destination Marketing & Management, 1*(1–2), 36–46.

Neuhofer, B., Buhalis, D., & Ladkin, A. (2013). High tech for high touch experiences: A case study from the hospitality industry. In L. Cantoni & Z. Xiang (Eds.), *Information and communication technologies in tourism 2013* (pp. 290–301). Vienna: Springer Verlag.

Niininen, O., Buhalis, D., & March, R. (2007). Customer empowerment in tourism through consumer centric marketing (ccm). *Qualitative Market Research: An International Journal, 10*(3), 265–281.

Patsadu, O., Nukoolkit, C. & Watanapa, B. (2012). Survey of smart technologies for fall motion detection: Techniques, algorithms and tools. *Advances in Information Technology*, 137–147.

Peterson, S. (2011). *Hotel 2020: The personalization paradox driving intimacy, consistency and efficiency for profitable growth*. United States of America: IBM Institute for Business Value.

Piccoli, G., O'Connor, P., Capaccioli, C., & Alvarez, R. (2003). Customer relationship management–a driver for change in the structure of the u.S. Lodging industry. *Cornell Hotel and Restaurant Administration Quarterly, 44*(61), 61–73.

Pine, J. B., & Gilmore, J. H. (1999). *The experience economy: Work is a theatre and every business a stage*. Cambridge: Harvard Business School.

Pizam, A. (2010). Creating memorable experiences. *International Journal of Hospitality Management, 29*(3), 343.

Poslad, S., Laamanen, H., Malaka, R., Nick, A., Buckle, P. & Zipf, A. (2001). *Crumpet: Creation of user-friendly mobile services personalized for tourism*. Paper presented at the 3G London.

Prahalad, C. K., & Ramaswamy, V. (2004). Co-creation experiences: the next practice in value creation. *Journal of Interactive Marketing, 18*(3), 5–14.

Raento, M., Oulasvirta, A., & Eagle, N. (2009). Smartphones an emerging tool for social scientists. *Sociological Methods Research, 37*(3), 426–454.

Ramaswamy, V. & Gouillart, F. (2008). Co-creating strategy with experience co-creation. *Balanced Scorecard Report, 10*(4), 1–3.

Ritzer, G., & Jurgenson, N. (2010). Production, consumption, prosumption. *Journal of Consumer Culture, 10*(1), 13–36.

Rogerson, J. M., & Sims, S. R. (2012). The greening of urban hotels in South Africa: evidence from Gauteng. *Urban Forum, 23*(3), 391–407.

Rust, R., & Oliver, R. (2000). The real-time service product: Conquering customer time and space. In J. A. Fitzsimmons & M. Fitzsimmons (Eds.), *New service development: Creating memorable experiences* (pp. 67–89). London: Sage.

Sandström, S., Edvardsson, B., Kristensson, P., & Magnusson, P. (2008). Value in use through service experience. *Managing Service Quality, 18*(2), 112–126.

Schmidt-Belz, B., Nick, A., Poslad, S. & Zipf, A. (2002). *Personalized and location-based mobile tourism services*. Paper presented at the Proceedings from the Workshop on Mobile Tourism Support Systems.

Schmidt-Rauch, S. & Schwabe, G. (2013). Designing for mobile value co-creation—the case of travel counselling. *Electronic Markets, March*.

Shaw, G., Bailey, A., & Williams, A. M. (2011). Service dominant logic and its implications for tourism management: the co-production of innovation in the hotel industry. *Tourism Management, 32*(2), 207–214.

Sheldon, P. (1997). *Tourism information technologies*. Oxford: CAB.

Shen, A., & Ball, A. D. (2009). Is personalization of services always a good thing? Exploring the role of technology-mediated personalization (tmp) in service relationships. *Journal of Services Marketing, 23*(2), 80–92.

Sigala, M. (2009). E-service quality and web 2.0: Expanding quality models to include customer participation and inter-customer support. *The Service Industries Journal, 29*(10), 1341–1358.

Tussyadiah, I.P. & Fesenmaier, D.R. (2007). *Interpreting tourist experiences from first-person stories: A foundation for mobile guides*. Paper presented at the 15th European Conference on Information Systems, St. Gallen, Switzerland.

Tussyadiah, I. P., & Fesenmaier, D. R. (2009). Mediating the tourist experiences: access to places via shared videos. *Annals of Tourism Research, 36*(1), 24–40.

Uriely, N. (2005). The tourist experience: conceptual developments. *Annals of Tourism Research, 32*(1), 199–216.

van Limburg, B. (2012). Visiting suriname, using dart to analyze a visitor's perspective in a cocreation enviornment. *Information Technology and Tourism, 13*(2), 119–132.

Vargo, S. L., & Lusch, R. F. (2008). Service-dominant logic: continuing the evolution. *Journal of the Academy of Marketing Science Review, 36*(1), 1–10.

Wang, D., & Fesenmaier, D. R. (2013). Transforming the Travel Experience: The Use of Smartphones for Travel. In L. Cantoni & Z. Xiang (Eds.), *Information and communication technologies in tourism 2013* (pp. 58–69). Vienna: Springer Verlag.

Wang, F., Head, M., & Archer, N. (2000). The relationship building model for the web retail market place. *Internet Research: Electronic Networking Applications and Policy, 10*(5), 374–384.

Wang, D., Fesenmaier, D. R., Werthner, H., & Wöber, K. (2010). The journal of information technology and tourism: A content analysis of the past 10 years. In U. Gretzel, R. Law, & M. Fuchs (Eds.), *Information and communication technologies in tourism 2010* (pp. 3–16). Vienna: Springer Verlag.

Wang, D., Park, S., & Fesenmaier, D. R. (2012). The role of smartphones in mediating the touristic experience. *Journal of Travel Research, 51*(4), 371–387.

Werthner, H., & Klein, S. (1999). *Information technology and tourism: A challenging relationship*. Vienna: Springer.

Worden, K., Bullough, W. A., & Haywood, J. (2003). The smart approach - an introduction to smart technologies. In K. Worden, W. A. Bullough, & J. Haywood (Eds.), *Smart technologies*. River Edge: World Scientific.

Yin, R. K. (2003). *Case study research: Design and methods* (3rd ed.). London: Sage.

Yovcheva, Z., Buhalis, D., & Gatzidis, C. (2013). Engineering augmented tourism experiences. In L. Cantoni & Z. Xiang (Eds.), *Information and communication technologies in tourism 2013* (pp. 24–35). Vienna: Springer Verlag.

Zach, F. J., Gretzel, U., & Xiang, Z. (2010). Innovation in web marketing programs of american convention and visitor bureaus. In U. Gretzel, R. Law, & M. Fuchs (Eds.), *Information and communication technologies in tourism 2010* (pp. 47–63). Vienna: Springer Verlag.