Published in Journal of hospitality and tourism management, 2016, vol. 29, pp. 69-79 which should be cited to refer to this work.

An Importance Performance Analysis of Smartphone Applications for Hotel Chains

Meng-Mei *Chen*[ab](Corresponding Author), Hilary Catherine *Murphy*[ac], and Stephan *Knecht*[d]

[a] Learning and Research Department, Ecole hôtelière de Lausanne, Route de Cojonnex 18, 1000 Lausanne 25, Switzerland
[b] Meng-Mei.Chen@ehl.ch
[c] Hilary.Murphy@ehl.ch
[d] Stephan.Knecht@ehl.ch

Abstract

The proliferation of smartphone ownership and mobile travel bookings has persuaded hoteliers to develop mobile strategies and develop applications (apps). To investigate the customer perception of these apps, a two-stage methodology was applied that identifies the available features and functions on 20 hotel chain apps. Next, the importance and performance of these 51 identified features and functions are then rated and analysed using the Importance Performance Analysis (IPA) framework. Most of the features and functions under "Reservation Information" and "Hotel Information" are commonly available, and are rated high in importance and performance, which is located in Quadrant two, "Keep up the good work". "At Hotel Functions" are not commonly available, but rated important by customers, thus placed in Quadrant one, "Concentrate here". Thus, IPA highlights specific, exclusive opportunities for hotels to engage via apps with customers during their stay.

Keywords: apps, hotels, IPA, smartphone, Spillover effect

Highlights:

- "Reservation Information" and "Hotel Information" are commonly available, and have been rated high in both importance and performance
- "At Hotel Functions" are not commonly available, but are rated important by customers
- "At Hotel Functions" provide specific, exclusive opportunities for hotels to engage with customers during their stay
- The lack of "At Hotel Functions" could indicate that the property-level operational and IT support are missing
- IPA is a useful framework to model customer satisfaction as a function of importance
- The Spillover effect suggests that hotel apps should not replicate the features and functions available on popular apps

1 Introduction

The proliferation of smartphones and tablets now extends when and where customers engage with content (Dickinson et al., 2014; Xiang, Wang, O'Leary, & Fesenmaier, 2014; comScore, 2013). The rising popularity of smartphones and tablets contributes to the development and diffusion of apps (Lu, Mao, Wang, & Hu, 2015), and the market for apps is one of the fastest-growing in the history of consumer technology (Newark-French, 2011). Most of the mobile access is now through apps with consumers showing a preference for mobile apps versus mobile websites (Nielsen, 2014). Though, recent data suggests that apps are reaching their saturation point in number, the amount of time spent on apps is expanding with a reported 21% yearly increase in 2014 (Nielsen, 2014). Meanwhile, the European online travel market continues to grow, partially fuelled by bookings made from smartphones and tablets (Phocuswright, 2013). Similarly, mobile travel bookings are projected to triple, with mobile bookings contributing 20% of European travel, mostly attributable to the mobile apps of online travel agencies (OTAs) stimulating growth (Phocuswright, 2013).

Wang, Xiang, Law, & Ki (2015) emphasise that hotels apps are lagging behind OTA apps in terms of hotel information, integrating with loyalty program, reservation capacity, and app stability. In fact, Freed (2014) reported that OTAs and meta search apps have been installed between 12 to 25 million times, while hotel brand apps have been installed as few as 142,000 to 434,000 times. eMarketer (2014) also stated that for both business and leisure travellers, branded hotel apps are less popular than travel aggregator apps. As such, the hotel industry has yet to profit from the powerful distribution reach and marketing power of apps (Wang et al., 2015).

For mobile tourism services, Goh, Ang, Lee, & Lee (2010) propose that travellers prefer the basic services such as those providing information about transportation, accommodation and food; but care less about context-aware services and trip planning. The most common available features and functions on the hotel specific mobile apps are; room reservation, property searches, real-time feedback via guest surveys, area information, loyalty account access, restaurant and spa reservations, property maps, etc. (Wang et al., 2015; Adukaite, Reimann, Marchiori, & Cantoni, 2013; eMarketer, 2013). Nonetheless, more recent research reported that the main features and functions that travellers want from their smartphones are nearby availability and planning tools with less interest in transactional features (MCDPartners, 2014).

New devices and apps have fundamentally reshaped the way people gather information and consume travel and hospitality related products (Buhalis & Law, 2008; Wang, Park, & Fesenmaier, 2012; Stienmetz, Levy, & Boo, 2013). Given the accelerating adoption of apps and mobile websites, the growing ownership of mobile devices, the contribution of mobile travel bookings to the overall travel market, and the proliferation of app development for both IOS and Android platforms, the comparatively low downloading of hotel apps, it is critical to investigate the customer preferences and performance evaluation of the features and functions of hotel apps (Wang et al., 2015). Research on context specific apps is limited (Wang et al., 2015) and focuses specifically on taxonomies and hoteliers' opinions (Eriksson, 2014; Okazaki, Campo, Andreu, & Romero, 2014; Chen, Hsu, & Wu, 2012; Adukaite et al., 2013).

By examining the gap between the importance and performance ratings of the hotel app features and functions, from a customer perspective, this study will contribute not only to the

literature but also to practice. The main contribution to the literature will be in examining the apps market, specifically in the context of hotels using the Importance Performance Analysis (IPA) framework for analysis. Despite the growing importance of apps, there has been limited, academic or empirical research, that both rate the importance and the performance levels of app features and functions from a hotel customers' viewpoint. It will expand to 51 features and functions, significantly extending beyond the 14 functional features in the study by Wang et al. (2015). While other studies investigated only some aspects of hotel apps, they fail to investigate the incongruities between apps developed and their functions and features that are used in the hotel sector (Wang et al., 2015). Thus, this research aims to investigate and fill this gap. Furthermore, it will extend the characteristics and taxonomies already defined by previous researchers in an increasingly mobile travel customer market. It contributes to our understanding of the app usage for a range of users, both hotel apps users and generic apps users, who may be potential customers for hotels. It further answers a call by previous researchers (Wang, Xiang, & Fesenmaier, 2014b, p.25) that further research on devices "should extend beyond the focus on functionalities".

This research will also contribute to managerial practice in a number of ways, for example, to inform the design of content for apps and to promote value-added app usage by consumers. For practitioners, the presentation and analysis of attributes on the four quadrants of IPA are easy to understand, and will assist managers in allocating resources to the most critical areas (Martilla & James, 1977). Finally, the app market is very competitive and more recent statistics by Nielsen (2015) show that if you are not established as one of the "favourite 27" of apps installed, then adoption is likely to be short term. This is emphasized by the most recent data that states that travel and entertainment apps are the most readily discarded

(Nielsen, 2015). This raises questions over the efficacy of app development which may lead to vital financial and technology resources being depleted by developing hotel specific apps.

This research paper is presented in the following order. After the introduction, the relevant literature and research on smartphone, tablet and apps research is presented to provide the theoretical foundation of this research. The methodology section details the research design, population and sample, data collection and data analysis procedure. Key findings are presented in the results and are followed by the discussions section. Finally, the conclusion, implications of the findings and research limitation are elaborated.

2 Theory/Issues

The Internet has empowered hotel customers with better information and more choices, and consequently accelerated change in customer communication, particularly the growth of mobile marketing (Dickinson et al., 2014; Lu, Mao, Wang, & Hu, 2015; tom Dieck & Jung, 2015; Wang et al., 2015; Xing et al., 2014; Ling, Guo, & Yang, 2014; Hao, Yu, Law, & Fong, 2015; Ho, Lin, & Chen, 2012; Sparks & Browning, 2011; Vermeulen & Seegers, 2009). Given the intangible nature of many of the hotel services and the ubiquitous nature of smartphones and apps, they seem to offer the potential to reach hotel guests by providing access to online information before, during, and after phases of travel (Brown & Chalmers, 2003; Gretzel, Fesenmaier, Formica, & O'Leary, 2006). Researchers propose that the next wave of innovation will come from the accelerating growth in mobile technology, particularly the extension of their functionality and their applications (Dickinson et al., 2014; Wang et al., 2015; Wang & Xiang, 2012; Wang, et al., 2012; Coussement & Teague, 2013).

2.1 Mobile Technology- Smartphones and Tablets

Smartphones and tablets support ubiquitous computing, contextual computing, pervasive computing, ubiquitous connectivity to the Internet, and the integration of various sensors (Dickinson et al., 2014; Lamsfus, Wang, Alzua-Sorzabal, & Xiang, 2014; Wang et al., 2014b; Wang & Xiang, 2012; Morosan, 2014; Wang et al., 2012). The portable nature of smartphones and tablets have led researchers to investigate pre-trip, during trip and post-trip traveller behaviours (Wang et al., 2014a; Wang et al., 2012; Eriksson, 2014; MacKay & Vogt, 2012). Other research has focused on consumer behaviour as customers have migrated from passive information receivers to active and mobile information retrievers, deciding when and where they want the interactions (with companies) to take place (Coussement & Teague, 2013). Smartphones have transformed behaviours, information needs, decision making, experiences, documenting and sharing (Dickinson et al., 2014; Lamsfus et al., 2014; Wang et al., 2014b), thus altering the way hotels market their products and services to customers. The perceived benefits to consumers of using mobile technology have also been identified, e.g. ubiquity, convenience, immediacy, personalization, information access, pragmatism, money savings, innovation, planning capacity, and entertainment (Okazaki, Campo, Andreu, & Romero, 2014; Kim, Park, & Morrison, 2008). Notwithstanding, there are barriers to the use of mobile technology, which are reported as high entry costs, usage costs, security issues, poor technology capability and a lack of relevant services (Lu et al., 2015; Eriksson, 2014). Kim & Law (2015) provide a review of smartphones in tourism and hospitality marketing, emphasising, amongst other aspects, “the evolution of the smartphone consumers’ value perceptions in the mobile marketing context” (p.707).

2.2 Apps: Taxonomies and Categorizations

An application (app) refers to "software, tailor made for mobile devices which improve the delivery of mobile services" (Dickinson et al., 2014, p. 86). There are also several taxonomies that have been identified by researchers for travel apps. Kennedy-Eden & Gretzel (2012) have specified seven categories, including navigation, social, mobile marketing, transactional, security/emergency, entertainment and information. Wang & Xiang (2012) classify travel apps into eleven categories and identify four main design features while noting that consumers have preferred information services and design features. These eleven categories are; single city destination guide, online travel agency, language assistant, flight manager, theme park and resort guide, facilitators, multiple city destination guide, food finder, entertainment, live camera, and currency converter (Wang & Xiang, 2012). Wang (2013) simplifies the categorization with only four categories; communication, information search, entertainment, and facilitation, which are based on the services provided. More specifically, Goh et al. (2010) grouped the 40 information and functions needed by mobile travellers into five categories. These are; travel essentials, sightseeing, electronic services, emergency and medical services and trip planning. This research by Goh et al. (2010) is not simply a focus on taxonomy, but also identifies the app specific information needed by travellers.

2.3 Apps for the Hospitality and Travel Industry

Most recently Leung, Fong & Law (2013) audited hotel specific apps in Hong Kong and reveal that only a handful of hotels have apps for connecting to customers. Other research by Adukaite et al. (2013) focuses on apps offered by independent hotels, as compared to chains or multiple hotels. They classify content and functions available on hotel apps into six categories; information about the hotel, booking process, features and functions about

the destination, social media interaction tools, app settings, and extras. They find the most common features and information are hotel locations, room descriptions, restaurant menu, contact information, room amenities, photo gallery, booking, and phone or e-mail hotel. On the other hand, they report limited availability of social media interaction tools and information about destinations.

An in depth survey by Budd & Vorley (2013) stated that although airline apps accommodate mobile customers with an emphasis on individual customisation, flexibility and efficiency over face-to-face interaction, they questioned whether these apps are innovative in delivering customer service, or merely extensions of product's the service features.

Nonetheless, there is little investigation into hotel specific apps. Generic travel apps provide a wide range of information and travel planning tools. We argue that industry focused apps, such as airlines and hotel apps, serve users differently from generic travel apps. Lamfus et al. (2014) discuss this concept of specific context, proposing a framework to include an audit of current travel and tourism app functionalities while redefining the role of "context" for the app user. Specifically, the industry focused apps developed by companies serve informational, transactional, and relational purposes between the users and the companies (Wang et al., 2015). Furthermore, based on the number of installations, hotel apps lag behind OTA and meta search apps (Freed, 2014). The industry specific apps should be part of the marketing strategy in communication and customer relationship management (Lu et al., 2015; Wang et al., 2015), making it critical to investigate industry specific apps, such as hotel apps.

Our research will extend the scope and scale of the investigation into hotel apps, focusing on the customer perspective.

2.4 Importance-Performance Analysis (IPA)

The long established technology acceptance model (TAM) and the more recent 'Spillover effect' have been deployed to explain and analyse technology adoption. TAM has been used by various researchers to explain; travellers' intentions to use mobile devices (Oh, Lehto, & Park, 2009; Kim et al., 2008), intentions to use mobile phones to purchase airline ancillary services in air travel (Morosan, 2014), intentions to download and use apps (Lu et al., 2015; Kwong, Bae, & Blum, 2013; Okumus & Bilgihan, 2014). Researchers argue that TAM only represents the beginning of the potential influence and adoption of technology and is limited in understanding users' experience of technology artifacts in context-specific situation; hence research focus should extend beyond TAM (Wang et al., 2015; Lamsfus et al., 2014; Wang et al., 2014b). MacKay & Vogt (2012) examine the "Spillover effect" to explain the adoptions of mobile technology devices from everyday life that spillover to vacation behaviours, and vice versa (MacKay & Vogt, 2012; Wang et al., 2014a; Wang et al., 2014b; Tussyadiah & Zach, 2012). However, neither approach investigates the perceptions of both the importance and performance of hotel apps features from the customer perspective, which are addressed in the Importance Performance Analysis (IPA) framework, illustrated below.

[Figure One near Here]

IPA measures the perceptions of both the importance and performance of attributes and classifies attributes into four quadrants based on their ratings in comparison to the overall means of the importance and performance (Martilla & James, 1977). The first quadrant,

“concentrate here”, includes attributes with high importance but low performance. The second quadrant,” keep up the good work”, includes attributes with high importance and high performance. The third quadrant, “low priority”, includes attributes with low importance and low performance. The fourth quadrant, “possible overkill”, includes attributes with low importance but high performance.

IPA has been used in the wider tourism sector to investigate various issues, such as assessing destination competitiveness (Dwyer, Dragićević, Armenski, Mihalič, & Knežević Cvelbar, 2014), visitors’ satisfaction with public zoos (Lee, 2015), winter migrants’ park attributes (Sheng, Simpson, & Siguaw, 2014), shark tourism (Ziegler, Dearden, & Rollins, 2012), and convention centre service requirements (Breiter & Milman, 2006). Specifically, in the hotel sector, IPA has been widely used to investigate hotel service and amenities (Wilkins, 2010), hotel technologies (Beldona & Cobanoglu, 2007), job satisfaction (Pan, 2015), monitoring customer satisfaction (Martin, 1995; Albayrak & Caber, 2015), hotel performances and service quality (Ho, Feng, & Yen, 2014), in the context of crisis management (Israeli, Mohsin, & Kumar, 2011) and corporate social responsibility effectiveness of hotels (Tsai, Tsang, & Cheng, 2012).

There have been varied criticisms over the IPA framework and some drawbacks in terms of conceptual and methodological foundations, which have raised concerns over IPA validity in empirical applications (Lai & Hitchcock, 2015a; Lai & Hitchcock, 2015b; Sever, 2015; Oh, 2001). Lai & Hitchcock (2015a) review IPA studies in the hospitality and tourism industry and propose a detailed research framework that attempts to address some of the issues highlighted which we adapt in the methodological approach taken in this paper. The “IPA itself is considered an expectation-disconfirmation model that models customer satisfaction

as a function of importance" (Sever, 2015, p.43). Furthermore, IPA conceptually aligns with the process of identifying strengths and weaknesses of brands and products (Lewis & Chambers, 1999; Chapman, 1993; Cheron, McTavish, & Perrien, 1989; Jemmasi, Strong, & Taylor, 2011). IPA has also established as a viable alternative to the traditional SERVQUAL model (Parasuraman, Zeithaml, & Berry, 1988). In the competitive environment of the hotel sector, an analysis of the strengths and weaknesses of a service such as an app in terms of both importance and performance is critical, particularly when deploying resources and in aligning with marketing communication strategy.

Although previous researchers have classified travel apps into different categories and identified features and functions needed by mobile travellers, there is little investigation of customers' evaluation of app performance related to chains and multiple-hotel apps. Wang et al. (2015) investigated OTAs and Hotel apps using an IPA framework and app users' reviews to represent customers' evaluation. Wang et al. (2015) identified two limitations in their own approaches, including the features are limited to descriptions provided by app developers, and 'the assumption that the importance of an app feature is reflected in the frequency it is mentioned in user reviews'. Wang et al. (2015) recommend expanding the hotel app research because travellers' decisions will be impacted by innovative and emerging information channels such as mobile apps. Goh et al. (2010) further state that there is a lack of study of the travellers' desired services on mobile apps and Lu et al. (2015) conclude that "studies that examine which factors are beneficial or detrimental towards the acceptance of emerging technologies may prove particularly valuable" (p. 15). Lamfus et al. (2014) discuss context and here we investigate two different types of app users, who use apps in a various contexts.

Apps developed for hotel chains covering multiple properties may be perceived as more useful than apps specific to one hotel, and thus likely to be downloaded and "favourite-d" by more hotel customers. Hence, this research answers the call for more research (Lamsfus et al., 2014; Wang et al., 2014b; Lu et al., 2015) and examines the apps developed by hotel chains, which may have more economic resources, and could leverage economies of scale, provide more detailed customer information and optimize the overall app experience. Thus the overarching research question is,

What are the users' perceptions of the importance and performance of currently available features and functions of apps deployed by hotel chains?

Specifically, the main research questions addressed in this paper are to;

(1) What are the features and functions available on hotel chains' apps?

(2) How important are these features and functions to app users?

(3) How do hotel apps users perceive the importance and performance of features and functions, using both t-tests and the IPA framework?

3 Methods/Procedures

This exploratory study used a two-phase approach that is similar to the IPA research guide and framework proposed by Lai & Hitchcock (2015a) which commences with a content analysis which shapes the survey instrument to investigate the research questions. An online survey was conducted during the second phase.

3.1 Questionnaire Design

As recommended by Lai & Hitchcock (2015a), the items in this study are developed to reflect the specific meaning and nature of the context. In the first phase, we conducted a content analysis of hotel apps features and functions, and used the findings from content analysis to develop a questionnaire. "Content analysis is a valid method for making specific inferences from text to other states or properties of its source", (Krippendorf, 1980, p.103). Content analysis allows us to establish the context for enquiry and ensures that all items under scrutiny receive equal attention to support our inferences to help build the second phase, i.e. the survey instrument.

Similar to the approach used by Budd & Vorley (2013), a total of 20 apps from hotel chains were identified and downloaded from Apple's iTunes AppStore for Switzerland in August 2013. These hotel chains were Ritz Carlton, Waldorf Astoria, W Hotels, Ibis, Fairmont, Kempinski, Hilton, Shangri-La, InterContinental, Hyatt, Hotel Indigo, Holiday Inn, NH Hotels, Crown Plaza, Conrad, Radisson, Pullman, Novotel, Sofitel, and Mercure. These hotel apps had to meet the criteria of serving several hotels from different locations, hence hotel apps focusing on one property or multiple brands were excluded. All apps were installed and systematically inspected for available features and functions, and the complete results were recorded in a grid for aggregate analysis.

The findings from the content analysis resulted in several recurring categories and revealed a total of 51 features and functions offered by 20 hotel chains' apps. These 51 features and functions are available in various formats. Specifically, features are mainly text, pictures, or videos; while functions are mostly actions that can be performed by the app user, such as searching or booking (Adukaite et al., 2013). The identified features and functions from the

content analysis were then used as items in the questionnaire survey (Goh et al., 2010). The items were grouped under five categories adapted from Adukaite et al. (2013); Wang (2013) and Kennedy-Eden & Gretzel (2012), which are; Reservation Information, Hotel Information, At Hotel Functions, Social Media Links, and Additional Features and Functions.

The questionnaire includes an introduction to the survey; the rating of the level of importance of the 51 items identified; followed by a section on respondent demographics; and concluded with the rating of the level of performance of the 51 items if they were a hotel apps-user. The rating of the importance and the performance levels are completed separately to reduce any stereotypical effects (Lai & Hitchcock, 2015a). A seven-point Likert scale is used for rating the level of performance with a range from '1' representing 'very unimportant' to '7' representing 'extremely important'. The scales of performance range from '1' representing 'extremely poor' and '7' being 'very good'. Based on the pilot tests, modifications were made to ensure clarity and integrity of the questionnaire.

3.2 Online Survey and Data Collection

The second phase is a survey conducted via an online questionnaire. Couper (2000) provides a topology for Web-based surveys that informs the approach in the non-probability sampling techniques employed here. After the pilot test, an invitation to respond to a survey on the use of apps was posted on the authors' LinkedIn, Facebook, and university message board pages. The populations under investigation are apps users, though we further identifying a sub group of hotel-app users. A convenience sample using self-selection was deployed based on respondents initially identifying themselves as "apps users". The data collection for this

study was carried out during spring 2014. The collected data was analysed using descriptive statistics, means and standard deviation, gap analysis, t-tests, and IPA.

4 Results

4.1 Participant Profile

A total of 214 respondents completed the survey. The overall average age of the respondents is 26.1 years old, 42% of respondents are male while 58% are female, as shown in Table 1. This is comparable to the description of the sample population in Kwon, Bae, & Blum (2013), in that respondents are younger, as anticipated in the app user profile. On average, these respondents have 36 apps on their smartphones, but only 4.9 are specifically hospitality or tourism apps. Two sub groups had been created, namely "hotel apps users" (57 respondents) and "generic apps users" (157 respondents). Among these 214 respondents, 57 respondents (27%) completed both the ratings of importance and the performance evaluation and thus are referred to as "hotel apps users" and, while the remaining 157 (73%) respondents only completed the ratings of importance evaluation and were identified as "generic apps users".

[Table One near Here]

4.2 Features and Functions Available on Hotel Chain Apps

Table 2 addresses the first research question, 'What are the features and functions available on hotel chains' apps?' Table 2 presents the findings from the content analysis, including features and functions and their frequencies, shown in brackets, available on the 20 hotel

apps. These features and functions are grouped into five categories, including ‘Reservation Information’, ‘Hotel Information’, ‘At Hotel Functions’, ‘Social Media Links’, and ‘Additional Features and Functions’. All hotel apps have the following features and functions; booking and reservation (20), hotel search (20), map (20), localization (20), contact details (20), hotel overview (20), photos (20), services/amenities features (20), facilities (20), and app info (20). These are functions and features that are basic requirements in an app i.e. to facilitate the purchase decision and booking, and also replicate the basic web based functions and features. These features and functions were similarly identified by Wang et al. (2015) and Adukaite et al. (2013) as frequently present on apps for independent hotels in Germany, Austria, and the German-speaking part of Switzerland. The low frequencies items include; wake-up call (1), schedule a taxi (1), check-in/out (1), spa reservation (1), resort map (1), art in hotel (1), online store (1), world clock (1), newspapers (1), music player (1) and are in the categories of ‘At Hotel Functions’ or ‘Additional Features and Functions’, and indicate that few hotel chains offer these functions on their apps.

[Table Two near Here]

4.3 Perceived Importance of Features and Functions of Hotel Apps

Table 3 shows the results on the perceived importance rated by all 214 respondents, as well as the perceived performance rated by the 57 hotel app users. The mean and standard deviation of all respondents of the 51 features and functions are shown in Table 3 “Importance All” column, and address the second research question.

The overall mean of all 51 features and functions is 4.81, with a standard deviation of 1.71. Specifically, the overall mean values for the five categories are ‘Reservation Information’ (5.47), ‘Hotel Information’ (5.42), ‘At Hotel Functions’ (4.82), ‘Social Media Links’ (3.50),

and ‘Additional Features and Functions’ (4.21). The Cronbach alpha are ‘Reservation Information’ (0.78), ‘Hotel Information’ (0.90), ‘At Hotel Functions’ (0.87), ‘Social Media Links’ (0.91), and ‘Additional Features and Functions’ (0.86). The top ten most important features as determined by the mean values from all responses are; contact details (6.18), booking and reservation function (6.05), directions to the hotel (6.03), map (6.01), photos (6.01), hotel search (6.00), transportation information (5.86), check-in/out information (5.85), facilities information (5.65) and hotel overview (5.64). In comparison to the results from Table 2, contact details, booking and reservation function, map, photos, hotel search, hotel overview, and facilities information are available on all 20 hotel apps and demonstrate that the design of hotel apps do appear to match many of the user perceptions of importance. However, *directions to the hotel, transportation information, and check-in/out information are identified as important but only available on some hotel apps.*

The least important features and functions from a user perspective are; Foursquare link (3.02), Twitter link (3.19), Instagram link (3.35), Information about art at hotel (3.53), online store (3.58), YouTube link (3.58), app information (3.65), QR code scanner (3.95), music player (4.07), and Facebook link (4.07). These least important features and functions are mainly related to social media. When compared to the results from the content analysis on Table 2, hotel apps do not offer most of these functions either, which confirm the findings from Adukaite et al. (2013).

While the standard deviations were nominal in the ten most important features, there was significant variation in the ten least important features and functions. This implies that there are some agreements between the users’ perception on these more important features, but no

consensus on these less important features. The features and functions with the largest standard deviations are email link (1.93), Facebook link (1.93), YouTube link (1.88), Instagram link (1.85), wake-up call function (1.84), Twitter link (1.83), app feedback function (1.78), music player (1.75), world clock function (1.70), and Foursquare link (1.69). It is interesting to note that all six social media related functions belong to the largest spread of standard deviation group, indicating diverse perceptions about the importance of these features and functions for hotel apps.

4.4 Importance and Performance Ratings by Hotel Apps Users Using the IPA Framework

To answer the third research question, the ratings of performance of 51 items, the gaps between the means of the importance and the performance ratings by hotel app users are calculated and presented in Table 3 and Figure 2. A positive gap indicates the importance level is more than the performance level, signifying room for improvement. The top 10 items identified through a gap analysis are in the category of 'At Hotel Functions' and three items from 'Additional Features and Functions'. Lai & Hitchcock (2015a) in their IPA research methodology framework recommend t-tests to compare the ratings between the importance and the performance levels. Of the 51 items measured here, 30 items have significant differences, and their p-values are presented in Table 3.

[Table Three near Here]

[Figure Two near Here]

The means of the overall importance and performance are the cut-off points between IPA quadrants (Lee, 2015; Pan, 2015). The means of the importance and performance ratings of

every item are compared to the overall means of importance rating (4.72) and performance rating (3.99) of hotel apps users, and an IPA graph is shown in Figure 3.

[Figure Three near Here]

Items in the first quadrant have higher than the overall average rating in importance, but lower than the average rating in performance. These attributes are important but under performing, this indicates room for improvement. Of these 51 items, only seven items fall into the first quadrant of IPA. These seven items are check-in/check-out function; schedule a taxi, resort map, table reservation, concierge tips, flight tracker function, and app settings. The t-test results also show the gap between the importance and performance for these seven items are statistically significant, and should be prioritized (Lai & Hitchcock, 2015a).

Items in the second quadrant have a higher than the average ratings in both importance and performance, with the exception of the weather forecast (quadrant 4), meeting/events information (quadrant 4), and family information (quadrant 3), all other items under 'Reservation Information' and 'Hotel Information', are in the second quadrant, "keep up the good work". This result indicates a match between importance and performance. The third quadrant of "low priority" includes most items in "Social Media Links", and "Additional Features & Functions". It is interesting to note that only three items fall into the fourth quadrant of "possible overkill". They are weather forecast, meeting/event information, and Facebook link.

5 Discussion

5.1 Importance Ratings: Supplied Functions and Features versus Customers' Demand

This study shows that this particular sample used more apps than average with 36 apps compared to the reported average on 27 apps, identified the features and functions available on 20 hotel apps, and classified them under five categories. As shown in Table 2, these 51 items represent the provision of features and functions from the apps suppliers' perspective, versus the users' perspectives shown in Table 3. In Table 2, several features and functions under 'Reservation Information' and 'Hotel Information' categories have a frequency of 20, and are available at all 20 hotel chains' apps. When examined in details, 'Reservation Information' and 'Hotel Information' could be seen as redacted versions of information and content available on hotel websites. As the information is already available, they are easily pushed out to hotel apps.

On the contrary, items under 'At Hotel Functions' have much lower frequencies, and are only available at some hotel apps. 'At Hotel Functions' are related to hotel service and represent opportunities to interact with customers, provide customized service, and to enhance customers' experience while they are on property. The low frequencies of 'At Hotel Functions' may be explained by operational or technical barriers at property level to support app features and functions during the stay in real time (Kim & Law, 2015). Many hotel IT information structure and technologies are built on legacy systems that may prove problematic to interface with new software applications, for instance, geolocation tracking. In comparison, social media is a product of the Internet, and is built on an ubiquitous, open technology platform. Thus, the findings that 'Social Media Links' are more available than 'At Hotel Functions' which could also indicate that the property-level operational and IT support are missing for 'At Hotel Functions', that is, properties may not be equipped for implementation. This lack of presence of 'At Hotel Functions' may present opportunities for

hotel app developers to develop value-added services for customers while staying at the hotel, promoting a deeper, richer hotel stay.

5.2 'At Hotel Functions' and the Spillover Effect

The perceived high ratings of 'Reservation Information' and 'Hotel Information' may be reflective of the basic needs of hotel guests and the higher demand for information by customers (O'Neill & Mattila, 2010). The mean value of 'At Hotel Functions' shows that customers perceive these functions as important, even though they are not widely available. On the contrary, respondents give social media items lower ratings.

The top ten smartphone apps for 2013 are Facebook, Google Search, Google Play, YouTube, Google Maps, Gmail, Instagram, Maps (Apple), Stocks, and Twitter (Nielsen, 2013). When customers already have Facebook, Instagram, and Twitter apps, they are likely to prefer using these apps instead of social media links, mapping and search functions featured in hotel apps. Hence, the low importance ratings of social media links on hotel apps could be explained by the accessibility of social media on mobile devices where customers already have their preferred set of apps they use and do not wish to have a hotel app "mediate" their social connections.

The Spillover effect (MacKay & Vogt, 2012; Wang et al., 2014a; Wang et al., 2014b; Tussyadiah & Zach, 2012) suggests that hotel apps should not replicate the features and functions available on popular apps. Rather, hotel apps should provide hotel specific features and functions unique to the property, location and guest stays, which will encourage hotel guests to use apps to communicate with the hotel, and enhance their experience, even if it only means a short life span for the app while customers stay at the hotel. 'At Hotel

Functions' are not widely available on hotel apps, but, there are no other alternative providers that can access and promote the services and products available at property level! Hoteliers cannot compete with OTA apps or social media apps in the most common travel/ tourism app features and should focus on improving 'At Hotel Functions' to remain relevant and reach the customer. 'At Hotel Functions' is an area where a competitive advantage and more intense engagement could be exploited, for example and in this case, concierge tips, table reservation, check in / checkout should be featured as they appear in Quadrant 1 "Concentrate here".

A hotel app should not be limited to an information portal for digital hotel content. Nor should a hotel app replicate general functions and features of a smartphone or a general app. For example, functions such as wake-up call, newspaper, music player, QR code scanner are function already provided by the smartphone or other apps. Given the small screens of smartphones, and the need for simplicity and efficiency, hoteliers should consider removing these features and functions from their apps. We recommend that hoteliers use our IPA findings to prioritize their limited resources, remove investment needed for items in Quadrant 3 and 4, and reallocate the resources to improve items in Quadrant 1.

Furthermore, as the use of mobile devices in everyday work and social life increases, the Spillover effect could be expected to promote more extensive use of mobile devices in travel and hotel stays. Thus, hotel customers may use and adapt apps from their everyday life instead of downloading new apps just for their hotel stays. Google (2015) states that travel and holiday apps are the most likely apps to be forgotten, and on average 33% of installed apps within this category is "forgotten". Ideally, hotels should use apps to deliver customer service "in the moment" and, perhaps, consider them as a short term communication channel while the customer is present at the hotel.

Conclusion

The proliferation of smartphone ownership and apps, and the growth of mobile travel bookings drive hoteliers to understand and develop mobile strategies to satisfy their customers' needs. This research focused on identifying and evaluating the importance of features and functions of hotel apps in depth, rather than all the drivers and determinants, usability or intentions to use. TAM and IPA studies provide robust frameworks to investigate mobile apps. To some extents, TAM could be used to understand the intention to use mobile apps, whereas IPA measures more specific customers' perceptions at the attribute/ item level. Hence, TAM and IPA complement each other, and provide insights for both academia and practitioners.

Hoteliers should move beyond providing 'Reservation Information' and 'Hotel Information', and developing more 'At Hotel Functions' to interact with customers with relevant, timely, location based local knowledge and services, and enriching customers' destination experiences. Marriott hotels already provide guests with mobile check-in and check-out options, send room ready alerts to travellers, and encourage travellers' requests 72 hours before, during and after their stays on the Marriott app (Trejos, 2015). Hilton and Starwood have announced their plans to allow travellers unlock their rooms with their mobile apps (Mearian, 2014). Nevertheless, hoteliers should not treat mobile apps as a replacement of traditional phone calls, but imagine new and more effective operation procedures, as well as leverage the real time and location sensitive nature of mobile technology.

Another use of 'At Hotel Functions' would be to promote "unplanned spending". For example, can a hotel staff member send a push alert to all in-house, on property guests on a

rainy day and inform them of the dinner menu at the restaurant? Could geolocation be used to give customer additional information about availability of other hotel services, for example, discounted services at spa on off peak times? In large hotels, navigation around the property could also be utilized in an app. In hotels with personalized services, specific staff or customer relation managers could be introduced to the guests during their stay, for example, notification from the valet could notify the guest when their car is ready. Furthermore, hotels could leverage the global positioning system (GPS) related features on mobile phones, provide up to date links to the neighbourhood and the destination, and enrich customers travel experience. The data captured through hotel specific apps could be used to operate the hotel more effectively, guide customers to relevant offers and provide insights in to customer behaviour within the hotel itself. Tripadvisor, Priceline, Gogobot are already providing tourists with local restaurants, attractions, tours, and events information (O'Neil, 2014). Hotel companies could learn from these players, utilize the local knowledge and real-time information to meet and exceed customer expectations.

Hotel companies could also connect with their app users on return to their homes; inform them about the latest events in partner hotels located in that city. The Spillover effect could be used to inspire entertainment or holiday behaviour in their everyday life, e.g. take more short breaks, dine out, or organise events.

Given the shortage of space on the smartphone screen, hotel companies should maintain those features and functions, in Quadrant 2, "Keep up the good work", and perhaps allow the customer to customize the features and functions and/ or introduce new features and functions specific to the property and destination to match their preferences.

To be retained and memorable the hotel app has to be extraordinary to hold interest and gain space on the app screen. Nonetheless, given the time hotels need to develop their own apps, customers may stay with their preferred set and prove reluctant to replace one app in favour of another. Hotels have limited budget and infrastructure to support technology. Rather hotels should consider strategic partnerships with technology providers and participate in their apps and leverage their position, specifically on travel related, entertainment apps that are the most used apps or use "white label" apps that can be adapted to hotel needs.

A further, refined taxonomy of app users could be proposed regarding apps for the hotel sector, that delineates core features and functionalities, but then offers an extended array of customizable features and functions from which hotel guest could choose. However, the extent to which this is feasible would be limited by the technology provision at property level and competitive offers from other app providers.

Limitations and Future research

As an exploratory study, this research was based on a convenience sample. A limitation in the self-selection process used is the under-representation or over-representation of particular groups within the sample, and the inherent bias in convenience sampling which means that the sample is unlikely to be representative of the wider population being studied. Another limitation was the sample size with 214 responses who have installed one or more hospitality and travel apps, but only 57 had used hotel apps before. Kwon et al. (2013) report that most hospitality app users had used airline apps (70%) or restaurant apps (17%), but not hotel apps and Wang et al. (2015) analysed 5,878 OTAs and hotels app reviews and reveal that only 1,613 reviews (27%) are related to hotels while the rest are related to OTAs. This may indicate that customers are not yet ready for hotel specific apps. We present a series of

indicative, not generalizable, results here by respondents who are immersed in the topic under investigation, which provides deeper insights from a customer perspective, but also with the relatively few respondents are indicative of the lack of adoption of hotel-specific app users.

Post-hoc, we do include many of the key aspects of the research design proposed by Lai & Hitchcock (2015a), such as including new attributes, questionnaire design, pilot testing, and data collection. However, there were certain aspects of the research design that were not appropriate or applicable to our relatively smaller sample, e.g. multivariate normality testing. Thus, despite the limitation of generalizability associated with this method, this research shed light on a topic that is topical and describes important trends in the hotel specific app setting. Nevertheless it is critical to monitor trends in an evolving technology environment and future research should pay attention to emergent technologies and the integration of customer driven communication channels, which now include apps, particularly what the customer wants.

Future research would be to update the features and functions used in the questionnaire, as apps are updated on a regular basis, and extend the sample to a wider population. Furthermore, this research investigates customers' perspectives, and should be compared with managers' perspectives, as well as the actual usage data to identify any gaps or opportunities for improvement. This research highlights that apps are not about simply digitalizing content from the website, but may involve changing technology infrastructure and operational procedures. Hence, a further line of enquiry would be to investigate if hoteliers have measured the impact of apps and their consequent strategies to cope with new customer driven technologies.

Finally, this paper identified features and functions available at hotel apps, their importance and performance, but it does not attempt to explain why some functions are more important than others. Furthermore, future research could investigate the Spillover effect, the duration and longevity of specific app use, and how and when generic apps are deployed by customers in relation to hotel stays. This would indicate the lifespan of the hotel specific app and indicate if the app is an enduring trend, worthy of investment.

References

Adukaite, A., Reimann, A. M., Marchiori, E., & Cantoni, L. (2013). Hotel Mobile Apps. The Case of 4 and 5 Star Hotels in European German-Speaking Countries. In *Information and Communication Technologies in Tourism 2014* (pp. 45-57). Springer International Publishing.

Albayrak, T., & Caber, M. (2015). Prioritisation of the hotel attributes according to their influence on satisfaction: A comparison of two techniques. *Tourism Management*, *46*, 43-50.

Beldona, S., & Cobanoglu, C. (2007) Importance-performance analysis of guest technologies in the lodging industry. *Cornell Hotel and Restaurant Administration Quarterly,* 48 (3), 299-312.

Breiter, D., & Milman, A. (2006). Attendees' needs and service priorities in a large convention center: Application of the importance–performance theory. *Tourism Management*, 27 (6), 1364-1370.

Brown, B., & Chalmers, M. (2003, January). Tourism and mobile technology. In *ECSCW 2003* (pp. 335-354). Springer Netherlands.

Budd, L., & Vorley, T. (2013). Airlines, apps, and business travel: a critical examination. *Research in Transportation Business & Management*, *9*, 41-49.

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.

Chapman, R.G. (1993). Brand performance comparatives. *Journal of Products & Brand Management,* 2 (1), 42–50.

Chen, K.Y., Hsu, Y. L., & Wu, C. C. (2012). Mobile Phone Applications As Innovative Marketing Tools For Hotels. *International Journal of Organizational Innovation (Online),* 5 (2), 116.

Cheron, E.J., McTavish, R., Perrien, J. (1989). Segmentation of bank commercial markets. *International Journal of Bank Marketing,* 7 (6), 25–30.

ComScore. (2013). *2013 Mobile Future in Focus*. February 22. From http://www.comscore.com/Insights/Presentations-and-Whitepapers/2013/2013-Mobile-Future-in-Focus (accessed June 29, 2015).

Couper, M. P. (2000). Web-based surveys: A Review of Issues and Approaches. *Public Opinion Quarterly,* 64, 464-494.

Coussement, M. A., & Teague, T. J. (2013). The new customer-facing technology: mobile and the constantly-connected consumer. *Journal of Hospitality and Tourism Technology,* 4 (2), 177-187.

Dickinson, J. E., Ghali, K., Cherrett, T., Speed, C., Davies, N., & Norgate, S. (2014). Tourism and the smartphone app: Capabilities, emerging practice and scope in the travel domain. *Current Issues in Tourism*, *17*(1), 84-101.

Dwyer, L., Dragićević, V., Armenski, T., Mihalič, T., & Knežević Cvelbar, L. (2014). Achieving destination competitiveness: an importance–performance analysis of Serbia. *Current Issues in Tourism*, (ahead-of-print), 1-28.

eMarketer. (2013). *Travellers seek out local info via mobile*. September 9. From http://www.emarketer.com/Article/Travelers-Seek-Local-Info-via-Mobile/1010197 (accessed June 29, 2015).

eMarketer. (2014). *Can Apps Help Streamline Mobile Travel Sales?* June 18. From http://www.emarketer.com/Article/Apps-Help-Streamline-Mobile-Travel-Sales/1010936 (accessed June 29, 2015).

Eriksson, N. (2014). User categories of mobile travel services. *Journal of Hospitality and Tourism Technology,* 5 (1), 17-30.

Freed, J. Q. (2014). *Hotel brand apps on par with OTAs*. June 11. From http://www.hotelnewsnow.com/Article/13859/Hotel-brand-apps-on-par-with-OTAs (accessed June 29, 2015).

Goh, D. H., Ang, R. P., Lee, C. S., & Lee, C. K. (2010). Determining services for the mobile tourist. *Journal of Computer Information Systems*, 51 (1), 31.

Google. (2015). *App-nesia in the UK: The need for app re-engagement marketing.* March. From

https://storage.googleapis.com/think-emea/docs/article/App-nesia_in_the_UK_Google2015.pdf (accessed June 29, 2015).

Gretzel, U., Fesenmaier, D. R., Formica, S., & O'Leary, J. T. (2006). Searching for the future: Challenges faced by destination marketing organizations. *Journal of Travel Research,* 45 (2), 116-126.

Hao, J. X., Yu, Y., Law, R., & Fong, D. K. C. (2015). A genetic algorithm-based learning approach to understand customer satisfaction with OTA websites. *Tourism Management*, 48, 231-241.

Ho, C. I., Lin, M. H., & Chen, H. M. (2012). Web users' behavioural patterns of tourism information search: From online to offline. *Tourism Management*, *33*(6), 1468-1482.

Ho, L. H., Feng, S. Y., & Yen, T. M. (2014). Using Modified IPA to Improve Service Quality of Standard Hotel in Taiwan. *Journal of Service Science and Management,* 7, 222-234.

Israeli, A. A., Mohsin, A., & Kumar, B. (2011). Hospitality crisis management practices: The case of Indian luxury hotels. *International Journal of Hospitality Management*, *30*(2), 367-374.

Jemmasi, M., Strong, K. C., & Taylor, S. A. (2011). Measuring service quality for strategic planning and analysis in service firms. *Journal of Applied Business Research (JABR),* 10(4), 24-34.

Kennedy-Eden, H. & Gretzel, U. (2012). A taxonomy of mobile applications in tourism. *E-review of Tourism Research*, 10 (2), 47.

Kim, H. H., & Law, R. (2015). Smartphones in Tourism and Hospitality Marketing: A Literature Review. *Journal of Travel & Tourism Marketing*, (ahead-of-print), 1-20.

Kim, D. Y., Park, J., & Morrison, A. M. (2008). A model of traveller acceptance of mobile technology. *International Journal of Tourism Research*, 10 (5), 393-407.

Krippendorff, K. (1980). *Content analysis. An Introduction to its Methodology*. Sage.

Mo Kwon, J., Bae, J. I., & Blum, S. C. (2013). Mobile applications in the hospitality industry. *Journal of Hospitality and Tourism Technology*, *4*(1), 81-92.

Lai, I. K. W., & Hitchcock, M. (2015a). Importance–performance analysis in tourism: A framework for researchers. *Tourism Management*, *48*, 242-267.

Lai, I. K. W., & Hitchcock, M. (2015b) A consideration of normality in importance–performance analysis. *Current Issues in Tourism*, *18:10*, 979-1000. doi: 10.1080/13683500.2014.990423.

Lamsfus, C., Wang, D., Alzua-Sorzabal, A., & Xiang, Z. (2014). Going Mobile Defining Context for On-the-Go Travelers. *Journal of Travel Research*. doi: 0047287514538839.

Lee, H. S. (2015). Measurement of visitors' satisfaction with public zoos in Korea using importance-performance analysis. *Tourism Management*, *47*, 251-260.

Lewis, R. C., & Chambers, R. E. (1999). *Marketing leadership in hospitality: foundations and practices* (No. Ed. 3). John Wiley and Sons.

Leung, D., Fong, L. H. N., & Law, R. (2013). Assessing the visibility of hotels on smartphones: a case study of hotels in Hong Kong. In *Information and Communication Technologies in Tourism 2014* (pp. 841-854). Springer International Publishing.

Ling, L., Guo, X., & Yang, C. (2014). Opening the online marketplace: An examination of hotel pricing and travel agency on-line distribution of rooms. *Tourism Management*, *45*, 234-243.

Lu, J., Mao, Z., Wang, M., & Hu, L. (2015). Goodbye maps, hello apps? Exploring the influential determinants of travel app adoption. *Current Issues in Tourism* (ahead-of-print), 1-21.

MacKay, K., & Vogt, C. (2012). Information technology in everyday and vacation contexts. *Annals of Tourism Research*, 39 (3), 1380-1401.

Martilla, J. A., & James, J. C. (1977). Importance–performance analysis. *The Journal of Marketing*, 77–79.

Martin, D.W. (1995). An importance–performance analysis of service providers' perception of quality service in the hotel industry. *Journal of Hospitality & Leisure Marketing*, 3 (1), 5-17.

MCDPartners. (2014). *Seeking returns: Building loyalty at hotels through digital customer experience*. From http://mcdpartners.com/wp-content/uploads/2014/03/Seeing_Returns.pdf (accessed June 29, 2015).

Mearian, L. (2014). *Hilton and Starwood hotel guests can soon unlock rooms with smartphones.* November 3. From http://www.computerworld.com/article/2842645/hilton-and-starwood-hotel-guests-can-soon-unlock-rooms-with-smartphones.html (accessed June 29, 2015).

Morosan, C. (2014). Toward an integrated model of adoption of mobile phones for purchasing ancillary services in air travel. *International Journal of Contemporary Hospitality Management*, 26 (2), 6-6.

Newark-French, C. (2011). *Mobile App Inventory Hungry Enough to Eat Internet Display Ad Spend*. August 31. From http://blog.flurry.com/bid/71285/Mobile-App-Inventory-Hungry-Enough-to-Eat-Internet-Display-Ad-Spend (accessed June 29, 2015).

Nielsen. (2013). *Tops of 2013: Digital.* December 16. From

http://www.nielsen.com/us/en/insights/news/2013/tops-of-2013-digital.html (accessed June 29, 2015).

Nielsen. (2014). *Smartphones: so many apps, so much time.* July 1. From http://www.nielsen.com/us/en/insights/news/2014/smartphones-so-many-apps--so-much-time.html (accessed June 29, 2015).

Nielsen. (2015). *So Many Apps, So Much More Time for Entertainment*. June 11. From http://www.nielsen.com/us/en/insights/news/2015/so-many-apps-so-much-more-time-for-entertainment.html (accessed June 29, 2015).

Oh, H. (2001). Revisiting importance performance analysis. *Tourism Management*, 22, 617- 627.

Oh, S., Lehto, X. Y., & Park, J. (2009). Travellers' intent to use mobile technologies as a function of effort and performance expectancy. *Journal of Hospitality Marketing & Management*, 18 (8), 765-781.

Okumus, B., & Bilgihan, A. (2014). Proposing a model to test smartphone users' intention to use smart applications when ordering food in restaurants. *Journal of Hospitality and Tourism Technology,* 5 (1), 31-49.

O'Neill, J. W., & Mattila, A. S. (2010). Hotel brand strategy. *Cornell Hospitality Quarterly*, 51 (1), 27-34.

O'Neil, S. (2014). *The dullest, most vital trend in travel mobile apps: local curation*. September 11. From http://www.tnooz.com/article/gogobots-move-local-events-mirrors-broader-mobile-travel-app-trend/ (accessed June 29, 2015).

Okazaki, S., Campo, S., Andreu, L., & Romero, J. (2014). A Latent Class Analysis of Spanish Travellers' Mobile Internet Usage in Travel Planning and Execution. *Cornell Hospitality Quarterly*. doi: 1938965514540206.

Pan, F. C. (2015). Practical application of importance-performance analysis in determining critical job satisfaction factors of a tourist hotel. *Tourism Management*, 46, 84-91.

Parasuraman, A., Zeithaml, V.A., & Berry, L.L. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing*, 64 (1), 12–37.

Phocuswright. (2013). *Mobile, OTAs Drive Growth as European Travel Market Reaches New Heights.* December 12. From http://www.phocuswright.com/research_updates/mobile-otas-drive-growth-as-european-travel-market-reaches-new-heights (accessed June 29, 2015).

Sever, I. (2015). Importance-performance analysis: A valid management tool?. *Tourism Management*, 48, 43-53.

Sheng, X., Simpson, P.M., & Siguaw, J. A. (2014). US winter migrants' park community attributes: An importance–performance analysis. *Tourism Management*, 43, 55-67.

Sparks, B. A., & Browning, V. (2011). The impact of online reviews on hotel booking intentions and perception of trust. *Tourism Management*, 32(6), 1310-1323.

Stienmetz, J. L., Levy, S. E., & Boo, S. (2013). Factors Influencing the Usability of Mobile Destination Management Organization Websites. *Journal of Travel Research,* 52 (4), 453-464.

tom Dieck, M. C., & Jung, T. (2015). A theoretical model of mobile augmented reality acceptance in urban heritage tourism. *Current Issues in Tourism*, 1-21.

Trejos, N. (2015). *Marriott to hotel guests: We're app your service*. May 13. From http://www.usatoday.com/story/travel/2015/05/13/marriott-hotels-mobile-requests-two-way-chat/27255025/ (accessed June 29, 2015).

Tsai, H., Tsang, N. K., and Cheng, S. K. (2012). Hotel employees' perceptions on corporate social responsibility: The case of Hong Kong. *International Journal of Hospitality Management*, 31 (4), 1143-1154.

Tussyadiah, I. P., & Zach, F. J. (2012). The role of geo-based technology in place experiences. *Annals of Tourism Research*, 39 (2), 780-800.

Vermeulen, I. E., & Seegers, D. (2009). Tried and tested: The impact of online hotel reviews on consumer consideration. *Tourism Management*, 30(1), 123-127.

Wang, D. (2013). A framework of smartphone use for travel (Doctoral dissertation, University of North Texas).

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

Wang, D., & Xiang, Z. (2012b). The new landscape of travel: A comprehensive analysis of smartphone apps. *Information and communication technologies in tourism*, 2012, 308-319.

Wang, D., Xiang, Z., & Fesenmaier, D. R. (2014a). Adapting to the mobile world: A model of smartphone use. *Annals of Tourism Research*, 48, 11-26.

Wang, D., Xiang, Z., & Fesenmaier, D. R. (2014b). Smartphone use in everyday life and travel. *Journal of Travel Research.* doi: 0047287514535847.

Wang, D., Xiang, Z., Law, R., & Ki, T. P. (2015). Assessing Hotel-Related Smartphone Apps Using Online Reviews. *Journal of Hospitality Marketing & Management*, (just-accepted).

Wilkins, H. (2010). Using importance-performance analysis to appreciate satisfaction in hotels. *Journal of Hospitality Marketing & Management*, 19 (8), 866-888.

Xiang, Z., Wang, D., O'Leary, J. T., & Fesenmaier, D. R. (2014). Adapting to the internet: trends in travelers' use of the web for trip planning. In *Journal of Travel Research*. doi: 0047287514522883.

Ziegler, J., Dearden, P., & Rollins, R. (2012). But are tourists satisfied? Importance-performance analysis of the whale shark tourism industry on Isla Holbox, Mexico. *Tourism Management*, *33(3)*, 692-701.

Tables

Table 1*: Descriptive Statistics of the Sample (N=214)*

Table 1: Descriptive Statistics of the Sample (N=214)		
Variable	Frequency	%
Age		
≤ 25	163	76 %
26-35	24	11 %
36-45	11	5 %
46-55	9	4 %
≥ 56	7	3 %
Gender		
Male	89	42 %
Female	125	58 %
# of Apps on Smartphones		
1-5	14	7 %
6-10	34	16 %
11-15	22	10 %
> 15	144	67 %
# of Hospitality Apps on Smartphones		
0	26	12 %
1-5	122	57 %
6-10	44	21 %
11-15	14	7 %
> 15	8	4 %

Table 2*: Features and Functions available on Hotel Chain Apps*

Reservation Information	**Hotel Information**	**At Hotel Functions**	**Social Media Links**	**Additional Features and Functions**
Booking & Reservation (20)	Hotel Overview (20)	Concierge Tips (8)	Email (12)	App Info (20)
Hotel Search (20)	Photos (20)	Housekeeping (7)	Facebook (9)	App Feedback (9)
Map (20)	Services/Amenities (20)	Table Reservation (5)	Twitter (9)	App Settings (9)
Localization (20)	Facilities (20)	Call Operator (4)	YouTube (3)	Chain news/info (5)
Contact Details (20)	Rooms & Suites (19)	Activity Calendar (4)	Foursquare (2)	QR Code Scanner (3)
Loyalty program (17)	Dining (14)	Room Service (3)	Instagram (2)	Submit your Story (2)
Package/Special Offer (17)	Spa (13)	Wake-Up Call (1)		Flight Tracker (1)
Directions (14)	Check-in/out info. (12)	Schedule a taxi (1)		Art in Hotel (1)
Personal History (13)	Area & Activities (11)	Check-in/out (1)		Online Store (1)
Weather Forecast (8)	Family (8)	Spa reservation (1)		World Clock (1)
	Transportation info (5)	Resort map (1)		Newspapers (1)
	Meetings/Events (3)			Music Player (1)

Table 3*: Importance and Performance Ratings and IPA Quadrants "T" tests*

	All Importance	Hotel Apps Users Importance	Hotel Apps Users Performance	Hotel Apps Users Gap	P value	IPA
Reservation Information (RI)	Mean (Stdev)	Mean	Mean			Quadrant
RI 1 Booking & reservation function	6.05 (1.31)	6.05	5.64	0.41	0.13	2
RI 2 Hotel search function	6.00 (1.27)	5.98	5.51	0.47	0.09	2
RI 3 Map	6.01 (1.10)	6.11	5.27	0.84	0.00**	2
RI 4 Localization	4.97 (1.42)	5.05	4.48	0.57	0.07	2
RI 5 Contact details	6.18 (1.09)	6.07	5.45	0.62	0.02*	2
RI 6 Loyalty program function	5.02 (1.47)	5.12	4.65	0.47	0.12	2
RI 7 Package and special offers	5.30 (1.34)	5.35	5.12	0.23	0.38	2
RI 8 Directions to the hotel	6.03 (1.20)	6.04	5.47	0.57	0.03*	2
RI 9 Personal history function	4.97 (1.48)	5.18	4.33	0.85	0.01*	2
RI 10 Weather forecast	4.13 (1.56)	3.86	4.20	-0.34	0.28	4
Hotel Information (HI)						
HI 1 Hotel overview	5.64 (1.25)	5.44	5.20	0.24	0.39	2
HI 2 Photos	6.01 (1.13)	5.79	5.42	0.37	0.13	2
HI 3 Services / Amenities information	5.41 (1.16)	5.30	4.70	0.60	0.04*	2
HI 4 Facilities information	5.65 (1.05)	5.65	4.71	0.94	0.00**	2
HI 5 Rooms & suites information	5.50 (1.31)	5.53	4.94	0.59	0.04*	2
HI 6 Dining information	5.56 (1.16)	5.42	4.86	0.56	0.04*	2
HI 7 Spa information	5.15 (1.31)	4.98	4.53	0.45	0.12	2
HI 8 Check-in / Check-out information	5.85 (1.20)	5.72	4.96	0.76	0.00**	2
HI 9 Area & activities information	5.37 (1.27)	5.09	4.23	0.86	0.00**	2
HI 10 Family information	4.46 (1.47)	4.47	3.87	0.60	0.04*	3
HI 11 Transportation information	5.86 (1.11)	5.75	4.48	1.27	0.00**	2
HI 12 Meeting /Events information	4.65 (1.37)	4.42	4.39	0.03	0.92	4
At Hotel Functions (AH)						
AH 1 Concierge tips	5.36 (1.39)	4.98	3.55	1.43	0.00**	1
AH 2 Housekeeping function	4.61 (1.49)	4.61	3.54	1.07	0.00**	3
AH 3 Table reservation tool	5.24 (1.40)	4.98	3.00	1.98	0.00**	1
AH 4 Call operator	4.55 (1.53)	4.56	3.09	1.47	0.00**	3
AH 5 Activity Calendar	4.79 (1.43)	4.67	3.07	1.60	0.00**	3
AH 6 In-room dining order function	4.90 (1.59)	4.70	3.15	1.55	0.00**	3
AH 7 Wake-up call function	4.66 (1.84)	4.49	3.13	1.36	0.00**	3
AH 8 Schedule a taxi	4.76 (1.51)	4.75	3.20	1.55	0.00**	1
AH 9 Check-in /check-out function	5.27 (1.52)	5.42	3.55	1.87	0.00**	1
AH 10 Spa reservation tool	4.43 (1.55)	4.05	3.02	1.03	0.00**	3
AH 11 Resort map	5.10 (1.42)	5.12	3.33	1.79	0.00**	1
Social media links (SM)						
SM 1 E-mail link	4.26 (1.93)	4.32	3.85	0.47	0.24	3
SM 2 Facebook link	4.07 (1.93)	3.95	4.07	-0.12	0.76	4

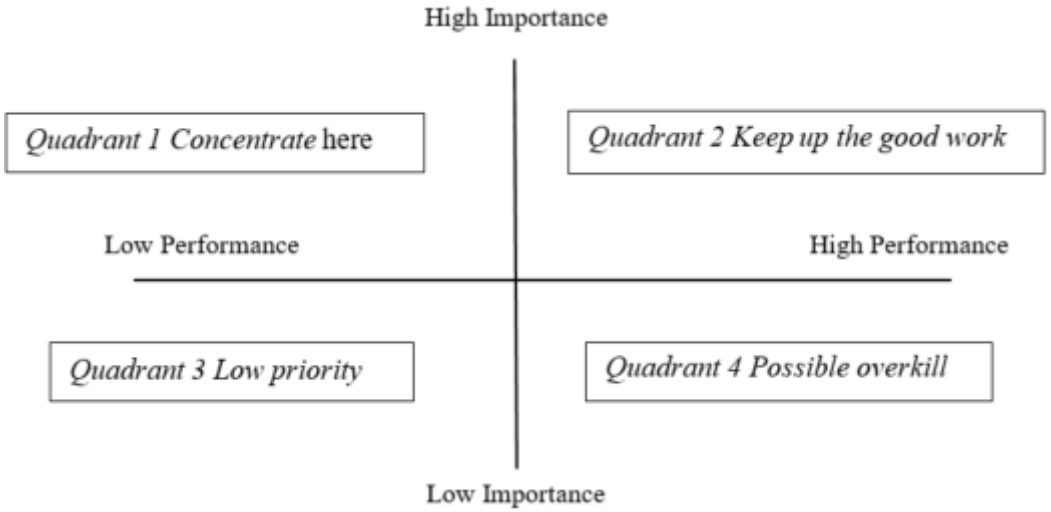
SM 3 Twitter link	3.19 (1.83)	3.32	3.55	-0.23	0.53	3
SM 4 YouTube link	3.58 (1.88)	3.74	3.62	0.12	0.77	3
SM 5 Foursquare link	3.02 (1.69)	3.18	3.28	-0.10	0.77	3
SM 6 Instagram link	3.35 (1.85)	3.40	3.43	-0.03	0.94	3
Additional Features (AF)						
AF 1 App information	3.65 (1.58)	3.61	3.69	-0.08	0.84	3
AF 2 App feedback function	4.22 (1.78)	4.30	3.13	1.17	0.00**	3
AF 3 App settings	5.39 (1.48)	5.25	3.67	1.58	0.00**	1
AF 4 Hotel chain news	4.14 (1.43)	4.00	3.70	0.30	0.37	3
AF 5 QR code scanner function	3.95 (1.59)	4.09	2.89	1.20	0.00**	3
AF 6 Submit your story function	4.27 (1.69)	4.04	3.51	0.53	0.17	3
AF 7 Flight tracker function	5.13 (1.62)	4.96	2.98	1.98	0.00**	1
AF 8 Information about art at hotel	3.53 (1.69)	3.72	2.73	0.99	0.00**	3
AF 9 Online store	3.58 (1.54)	3.46	3.23	0.23	0.47	3
AF 10 World clock function	4.10 (1.70)	3.89	3.29	0.60	0.09	3
AF 11 Newspaper	4.43 (1.62)	4.51	2.98	1.53	0.00**	3
AF 12 Music player	4.07 (1.75)	4.07	3.20	0.87	0.01*	3

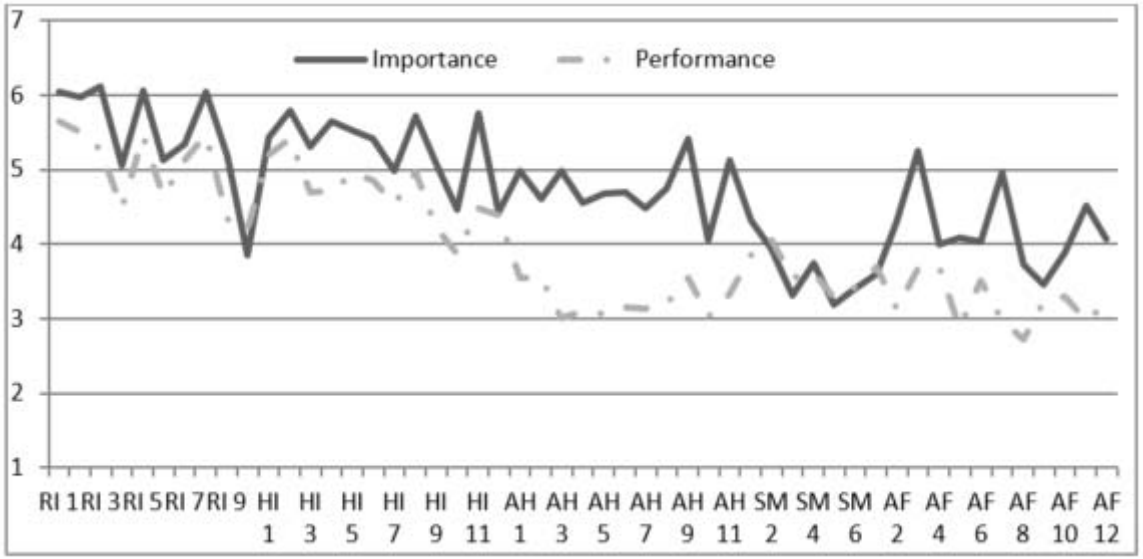
Figures

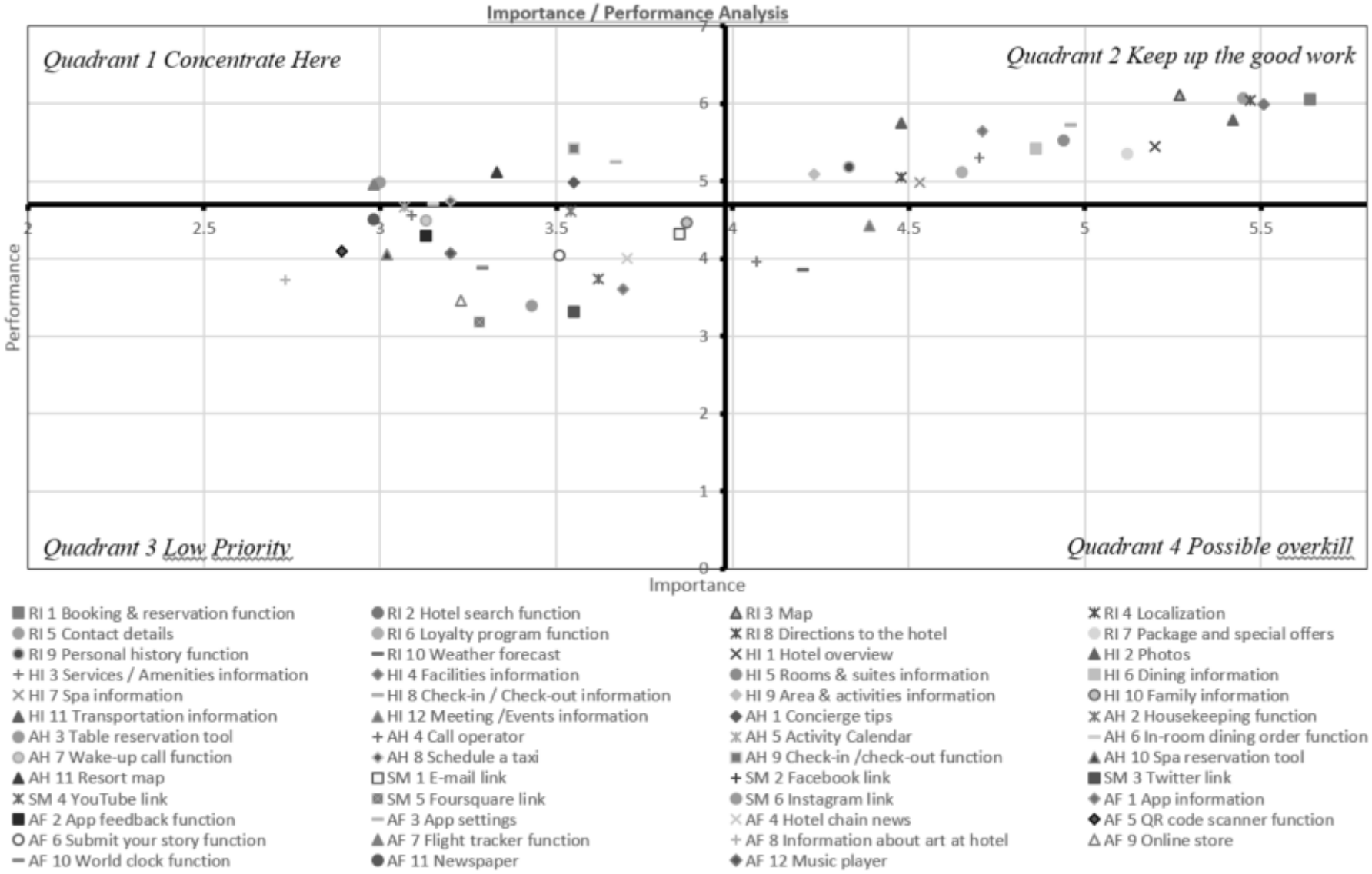
Figure 1: *Importance-Performance Analysis Quadrants*

Figure 2: *Importance and Performance Ratings from Hotel Apps Users*

Figure 3: *The IPA Framework*


High Importance
Quadrant 1 Concentrate here
Quadrant 2 Keep up the good work
Low Performance
High Performance
Quadrant 3 Low priority
Quadrant 4 Possible overkill
Low Importance


Importance
Performance
7
6
5
4
3
2
1
RI 1
RI 3
RI 5
RI 7
RI 9
HI 1
HI 3
HI 5
HI 7
HI 9
HI 11
AH 1
AH 3
AH 5
AH 7
AH 9
AH 11
SM 2
SM 4
SM 6
AF 2
AF 4
AF 6
AF 8
AF 10
AF 12


Importance / Performance Analysis
Quadrant 1 Concentrate Here
Quadrant 2 Keep up the good work
Quadrant 3 Low Priority
Quadrant 4 Possible overkill
Performance
Importance
2
2.5
3
3.5
4
4.5
5
5.5
0
1
2
3
4
5
6
7
RI 1 Booking & reservation function
RI 2 Hotel search function
RI 3 Map
RI 4 Localization
RI 5 Contact details
RI 6 Loyalty program function
RI 8 Directions to the hotel
RI 7 Package and special offers
RI 9 Personal history function
RI 10 Weather forecast
HI 1 Hotel overview
HI 2 Photos
HI 3 Services / Amenities information
HI 4 Facilities information
HI 5 Rooms & suites information
HI 6 Dining information
HI 7 Spa information
HI 8 Check-in / Check-out information
HI 9 Area & activities information
HI 10 Family information
HI 11 Transportation information
HI 12 Meeting /Events information
AH 1 Concierge tips
AH 2 Housekeeping function
AH 3 Table reservation tool
AH 4 Call operator
AH 5 Activity Calendar
AH 6 In-room dining order function
AH 7 Wake-up call function
AH 8 Schedule a taxi
AH 9 Check-in /check-out function
AH 10 Spa reservation tool
AH 11 Resort map
SM 1 E-mail link
SM 2 Facebook link
SM 3 Twitter link
SM 4 YouTube link
SM 5 Foursquare link
SM 6 Instagram link
AF 1 App information
AF 2 App feedback function
AF 3 App settings
AF 4 Hotel chain news
AF 5 QR code scanner function
AF 6 Submit your story function
AF 7 Flight tracker function
AF 8 Information about art at hotel
AF 9 Online store
AF 10 World clock function
AF 11 Newspaper
AF 12 Music player