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High tech meets high touch in upscale hotels

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Abstract

Purpose: This paper presents an analysis of the impact of current technologies on customer experiences in upscale hotels and assesses the potential of the latest technologies for enhancing their stay.

Design/methodology/approach: A two-step approach was applied in this study. The qualitative phase included an examination of upscale hotel websites, interviews with hotel managers and an Internet search regarding the latest technological innovations in hotels. In the quantitative stage, a questionnaire was developed for hotel guests, generating a sample of 310 valid completed questionnaires.

Findings: The results reveal that hotel guests value digital involvement in their hotel experience. Moreover, business travellers and younger generations give greater importance to the latest technologies.

Research limitations/implications: Hotel managers need to be aware that installing specific new technologies can significantly enhance guest experiences.

Originality/value: This study analyses the most innovative technologies, providing guidance for hoteliers wishing to upgrade or implement new technologies. Based on the findings, hoteliers can achieve greater differentiation by offering the most important and latest technology to guests, enhancing their experience and attracting new customers, which can potentially lead to increased revenues. This study's results are also important because they include the perceptions of both managers and customers.

Keywords: technological amenities, upscale hotels, guest experience, satisfaction

Paper type: Research paper

1. Introduction

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More than ever, technology is having a significant impact on all businesses, and the hotel industry is no exception. Hotels are facing an increasingly competitive market, so, to differentiate themselves, they must offer something new to capture customers' attention (Janes and Wisnom, 2003). The hotel of the future is likely to be completely personalised, using customers' preference data and advanced customisation technology (Doyle, 2014).

Currently, leisure guests and business travellers are looking for new experiences. In fact, customers' expectations of having access to the newest technology in hotels continue to grow. The increasing level of technological uptake by clients combined with the shorter life cycles of technology creates a major challenge for hotels. In the past, guestrooms provided access to different experiences with technology that people could not get in their homes. Nowadays, this has changed completely whereby, in most cases, what clients have in their homes is far superior to anything that is available in hotel rooms (Horner, 2012). Therefore, it is essential to provide in-room technology that reflects what is on the market now and what people are currently using (Trauthwein, 2012).

Several studies have shown the need for understanding what guests truly want in order to achieve a higher level of guest satisfaction (Howell et al., 1993; Skogland and Siguaw 2004). However, only a few studies, thus far, have examined the impact of technological amenities on hotel guest experiences/satisfaction (Cobanoglu et al., 2011; Usta et al., 2011; Jung et al., 2014), including one study that revealed that some new technologies are not appreciated by guests (Bilgihan et al., 2011). None of the studies have evaluated whether preferences vary according to guests' profile. In this context, it is essential to replicate studies focused on technology frequently because of how significantly it changes over time (Bilgihan et al., 2011). The present study adds to the existing literature by considering both the existing and latest technologies and by testing if preferences vary according to guests' profile.

Taking all of these reasons into account, the purpose of this study was to:

- analyse the importance of current technologies in customer experiences in upscale hotels
- assess the importance of the latest technologies in customer experiences in upscale hotels
- test whether the importance of the latest technologies in customer experiences in upscale hotels varies according to age group and purpose of travel

2. Literature Review

2.1 Technology in the Hospitality Industry

The hospitality industry started adopting technology in the early 1970s, and this process has been evolving quickly ever since (Collins and Cobanolgu, 2008; Erdem et al., 2009). Technology in hotels is often applied at different levels – both operational and managerial, as well as in-room guest service (Barker et al., 2003). Many hotels use technology as a value-added amenity to help create differentiation, enhance guest satisfaction and build loyalty among customers (Cobanoglu et al., 1999). According to an American Hotel and Lodging Association survey, hoteliers with more than 10 years of industry experience identify increasing guest satisfaction (82.4%), increasing employee efficiency (79.9%) and generating revenues (71.3%) as the primary reasons for using information technology (Brewer et al.,

2008). Olsen et al. (2000) identified information technology as the single greatest force driving change in the hospitality industry.

With the current rapid growth of technology, consumers expect that hotels will offer at least the same level of amenities as guests have in their homes (Trauthwein, 2012) since many hotel guests think of hotels as a 'home away from home' (Parets, 2004). According to Talwar (2012), 95% of guests expect that 'hotels will increasingly look to new technologies to drastically increase efficiency, reduce costs, personalise the customer experience and improve service'. Previous studies have indicated that hotel technology implementations can improve customer satisfaction, increase productivity and reduce costs, which can result in a competitive advantage (David et al., 1996; Van Hoof et al., 1996; Siguaw and Enz, 1999; Camison, 2000; Cobanoglu et al., 2001; Collins and Cobanoglu, 2008). Jung et al. (2014) conducted a survey of lodging operators and found that 62.5% of them reported 'successfully' or 'very successfully' enhancing customer experiences using in-room technology over the previous three years. Cobanoglu et al. (2011) concluded that the five highest rated technologies are in-room telephones, express check-in/check-out, in-room alarm clocks, easily accessible electronic outlets and in-room high speed Internet access (HSIA). In contrast, guests are the least satisfied with in-room universal battery chargers, video-conferencing capabilities, in-room fitness systems, in-room personal computers and in-room game systems (e.g. Wii or PlayStation). Other findings of this study were that in-room technologies, business essentials, and Internet access can enhance guest experiences and that these are factors that have a substantial impact on guest satisfaction. However, 'comfort technologies' have no impact on hotel guest satisfaction.

The implementation of in-room technology has not only improved in-room services but also provided new forms of entertainment (Barker et al., 2003). A study of hotel managers found that in-room entertainment systems are ranked second behind wireless Internet as the technology about which hotel guests care the most (Brewer et al., 2008). With this increasingly high level of guest expectations, hotel companies are gradually introducing up-to-date entertainment technology into rooms (Sieburgh, 2009; Barnes et al., 2012).

However, not all technologies have a positive impact on guest satisfaction (Cobanoglu et al., 2001). A related study found that some of these investments are a low priority for guests, including gaming consoles, Internet on televisions (TVs) and in-room fitness amenities. In contrast, other technology, such as free-to-guest TV, guest-device connectivity and HSIA are extremely important to customers and contribute to a higher level of satisfaction (Bilgihan et al., 2011). Beldona and Cobanolgu (2007) found that HSIA, express check-in and check-out and remote controls for TVs are ranked as having high importance and as representing high performance technology by guests. On the other hand, some technologies, such as videoconferencing capabilities, wireless access to the hotel website, a business centre and plasma screen TVs, were classified as 'low priority' by guests and were ranked as low performance and satisfaction items.

A related study showed that the most popular in-room technologies currently used by hotels include free HSIA in the room, flat panel high definition TVs, docking stations for mobile devices and pay-per-view (PPV) in-room movies. However, what is interesting is that only docking stations were found to be important to improving guest experiences (Jung et al., 2014). According to Usta et al. (2011), the five technological attributes associated with the highest satisfaction are in-room telephones, electronic key cards, in-room temperature control, remote control TVs and good lighting by which to read/work. However, in-room electronic safety boxes, self check-in, universal battery chargers, in-room gaming systems and free long

distance telephone calls (i.e. voice over Internet phones [VoIP]) were considered to be the five technological attributes associated with the lowest satisfaction.

Therefore, it clearly is critical to understand what hotel guests need and want. This knowledge helps hoteliers decide which products or services they should provide or how to adjust existing offerings in a way that is more appealing to guests, thereby meeting their requirements and expectations (Kotler et al., 2003; Lazer et al., 2006). Table 1 shows more details on a selection of studies used in this paper.

Insert Table 1 here.

2.2 Business and Leisure Hotel Guests

Business and leisure hotel guests are two segments of travellers who have different wants, needs and travel patterns, and, thus, they are assumed to have different demands (Radder and Wang, 2006). Nonetheless, currently, business travellers are not the only ones who want to remain connected, since leisure guests are devouring digital content more than ever before (Murray, 2013). Despite the growing interest of leisure guests in technology, the majority of studies continue to find some differences in guests' technological preferences related to guests' purpose of travel. A study by Lee and Tussyadiah (2010) revealed that the need for Wi-Fi service in hotels is stronger for business travellers than for leisure travellers. According to Bilgihan et al. (2011), the importance of business entertainment amenities (i.e. HSIA, universal battery chargers, guest-device connectivity, in-room desktop computers and in-room fitness facilities) was found to be significantly different for business and leisure guests. This make sense because HSIA in guests' rooms and guest device connectivity are perceived as more important by business travellers than by leisure guests.

Therefore, the results from previous studies suggest that technology is more important for business travellers than for leisure guests. Since guests' preferences can change over time, it is crucial to discover current trends in how the importance of technology varies according to purpose of travel. The following research hypothesis sought to test this:

> H1: The latest technologies are more important for business travellers than for leisure guests.

2.3 Generations and Technology

Sullivan et al. (2009) suggested that 'individuals from a respective generation can be differentiated from members of other generations not only by shared birth years but also by the unique social and historical experiences of the members' youths which permanently influenced their characteristics'. Three age ranges were included in the current study: baby boomers, those born from 1946–1964; generation X (hereafter, Gen X), those born from 1965–1982 and generation Y (hereafter, Gen Y), those born after 1982.

According to Yang and Jolly (2008), baby boomers are open to new technology. However, they are less likely to become early adopters because they are not always comfortable with technology (Eisner, 2005). Baby boomers have been less ready than younger generations to adopt some technologies, such as podcasts, kiosks and smartphones as services (LeRouge et al., 2014). Safety and privacy are more important for them than for other generations. Kim and Bernhard (2014) reported that 'younger consumers (Generation X and Y) were more strongly influenced by the perceived convenience and data security in determining their

intention to use a new technology at a hotel than older consumers'. Gen X is considered more adaptable and comfortable with technology than baby boomers because they have grown up in a world in which technological advances were already integrated into their lives (Morris and Venkatesh, 2000).

Regarding Gen Y, these individuals were born in a period of rapid technological change, the era of the Internet. This generation is completely comfortable with technology, since they have no real memory of a daily life without technology (Hanna, 2009). Nevertheless, Schoch (2012) suggested that Gens Y and X are similar regarding their preference for virtual meetings instead of face-to-face communication, still the favoured choice of older generations. In order to attract and satisfy Gen Y guests, hotels need to provide free Internet connection to guests and equip rooms with networking capabilities for iPods and personal digital assistants (Allcock, 2009). Each generation has different needs and wants, and, as technology continues to change the global business environment rapidly, it is important to keep up with new technology updates, as well as the new desires of future guests (Fenich et al., 2011).

Based on the above mentioned studies, in general, technology is more important for younger generations (i.e. Gens X and Y) than for baby boomers. As a result, our second research hypothesis was formulated as follows:

> H2: The latest technologies are more important for younger generations than for baby boomers.

3. Methodology

3.1 Research Context

The lodging industry sector is generally classified into six categories: luxury, upper-upscale, upscale, upper-midscale, midscale and economy hotels (Miller et al., 2013). The present study examines the upscale hotel segment, that is, hotels with four to five stars in Portugal, because they already have sophisticated technology and because the owners of these hotels are looking to new technology as a way to be competitive in an ever-changing world. According to a study by Jung et al. (2014), upscale or luxury hotels are 18.2% more likely to implement hotel technological amenities than economy hotels are over the next three years, in order to increase their quality of service and, consequently, meet their guests' expectations.

3.2 Data Collection Methods

3.2.1 Qualitative Research

This study employed a two-step approach. In the qualitative phase, an analysis of Portuguese upscale hotel websites was performed to gain an understanding of the current technological amenities in upscale hotels. The four hotel groups listed as those having the greatest number of available rooms in Portugal are Pestana, Tivoli, Vila Galé and Accor (Deloitte, 2014). Therefore, the websites of five hotels in each group were analysed. The choice of hotels was made based on their category, with preference given to five-star hotels in each group. Within this star category, selections were made randomly. Based on the technologies presented on the websites of the 25 selected hotels, the following list was created of 19 technologies: movies on demand, in-room TVs in bathrooms, alarm clocks, TV-speakers/music in bathrooms,

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iHome with iPod and radio, fixed and portable telephones, mini-bars, liquid-crystal-display (LCD) TVs, coffee/tea making facilities, in-room electronic safes, cable/satellite channels, 24-hour net centres, hair dryers, Wi-Fi access in public areas, air conditioning, in-room wireless Internet, video games on demand, CD/DVD players and voicemail.

In the qualitative research stage, two interviews with managers of Portuguese upscale hotels were also conducted mainly to determine which technology they are planning to implement in the future. In addition, interviewers sought to understand if there is congruence between the managers' perceptions of guests' technological demands and desires and guests' perception of these. The beginning of the interview established that both managers have similar technology available in their hotels: air conditioning, mini-bars, hair dryers, telephones, cable/satellite channels, LCD TVs, safes, alarm clocks and PPV channels in rooms, business centres with computers and Internet and Internet access in both rooms and public areas. The second part of the interviews focused on the impact of technology on customer experiences.

Both managers indicated that technologies have a positive impact on guest experiences and that the most important technology for guests is Wi-Fi Internet. The perception of the managers is that guests are satisfied with the available technologies but that customers could be more fully pleased. Although access to the Internet has become a requirement for all guests, the hotel managers interviewed feel that business travellers are more demanding about technologies than leisure guests are. The interviewees also reported that technologies can have an impact on customers' choice of hotel. Another important conclusion is that enhancing customer experiences is the main reason for hotel managers to invest in new technology. Regarding new technologies, one manager stated that the hotel's latest investment was in a virtual concierge and an Xbox 360 console in the lobby. For the future, this manager is studying the possibility of installing a video conferencing device. The other hotel has made a considerable number of investments in on-going upgrades of existing technologies. The latest technologies mentioned by the hotel managers were introduced into the hotel guest questionnaire to obtain customers' feedback about these amenities.

Finally, in this first stage, an Internet search was performed targeting international hotel chains to gather a further understanding of the latest technological innovations. The results are presented in Table 2.

Insert Table 2 here.

3.2.2 Quantitative Research

In the second phase of quantitative research, a questionnaire was developed targeting hotel guests. The questionnaire was divided into four parts. The first section concentrated on demographic characteristics. The second part was focused on guests' opinions regarding the importance of, and satisfaction with, technologies they experienced in their last hotel stay. They were asked to rate 19 technologies using two seven-point Likert-type scales on the technology's importance (1 = 'Not at all important' and 7 = 'Extremely important') and on the guests' satisfaction (1 = 'Not satisfied at all' and 7 = 'Extremely satisfied'). The 19 items were the technologies found through the analysis of hotel websites and, thus, were likely to have been experienced by guests. Respondents were also asked if the available technologies had a positive impact on their hotel stay experience. In the third section, respondents were asked to rate the importance of the 14 latest technologies during their stay, also based on the qualitative phase data and a seven-point scale. These items were identified from the technologies reported by the hotel managers in the interviews and from the market study. The

next questions were about customers' technological preferences for some activities in hotels and about the impact of new guestroom technologies during their stay, in order to understand if guests need new technologies to have a better experience or if the available ones that they found in hotels are enough.

Before administering the questionnaire, a pre-test was made with a sample of 10 people. After the pre-test, some adjustments were made based on the respondents' recommendations. The questionnaire was distributed in person in upscale hotels in Portugal.

Respondents were both leisure and business travellers. The target population was defined as adult guests who had already stayed in one or more upscale hotels (i.e. four and five stars) within the previous 12 months in Portugal. After removing invalid questionnaires and those that contained errors or that were incomplete, 310 were eligible for analysis.

4. Results

4.1 Demographic Profile Description

The guest questionnaire was completed by 310 respondents of which 50% were male, and 50% were female. Categorised by age, 35.8% of respondents were between 26 and 34 years old, 29% were between 18 and 25 and about one-quarter (24.2%) were between 35 and 54 years old. |A few respondents were between 55 and 64 (8.1%), and only 2.9% were older than 65 years old. In terms of marital status, almost half of the respondents were single (49.4%), and 43.5% were married or were cohabitating. The remainder of the respondents were divorced, separated or widowed (7.1%).

4.2 Last Stay in a Portuguese Upscale Hotel

Regarding their last stay in Portugal, respondents reported a wide variety of upscale hotels, but some hotel groups stood out for their stronger presence in the sample. The six most representative hotel groups were Sana (7.7%), Vila Galé (5.8%), Accor (5.5%), Pestana (5.2%), Nau hotels and resorts (3.9%) and Tivoli (3.9%). Together, these six hotel groups represent 31.9% of the sample. When examining the purpose of the respondents' last stay, the vast majority of respondents (67.1%) were leisure guests, while just 20.3% were travelling on business or for work. A small portion of the sample (10%) were travelling for both reasons: business and leisure. Almost 40% of the respondents said they travelled as a couple (37.4%), 26.5% went with family and 17.4% with friends. The remainder of the sampled guests were travelling alone (12.9%), and only 5.8% were travelling with co-workers.

In general, almost all respondents (91%) were satisfied with the technological amenities that they found in their last upscale hotel stay in Portugal. Although 94.9% of respondents reported that technology had a positive impact on their experience, 52.3% stated that they would like to add new technologies or exchange some of them for newer ones, to have a better or different experience. Moreover, 42.6% of the respondents considered the available technologies were adequate, allowing guests to have a good experience, so they would not change or add anything. A small part of the sample (4.5%) stated that the available technologies did not have a positive impact on their experience and that new and more advanced technologies were needed. Only 0.6% of the respondents reported that the available

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technologies had a negative impact on their experience because the amenities were outdated. This segment of the sample also wanted new technologies to improve their experience.

4.2.1 Importance-Satisfaction Gap Analysis – Current Technologies

The survey participants were asked to rate the importance of 19 technologies and their satisfaction with them during their last hotel stay. For this question, respondents had the option to select 'never used' or 'not available' if they did not have any experience with hotel technology in the last hotel they stayed in. Respondents that selected these two options were eliminated from the data analysis, as shown in column N of Table 3. In order to test the significant mean difference (i.e. gap) between respondents' perceptions of importance and satisfaction with the 19 technological amenities, a paired *t*-test was used. The results are presented in Table 3.

Insert Table 3 here.

According to the importance-satisfaction matrix used in the present study (Bilgihan et al., 2011), the data show that movies on demand, in-room TVs in bathrooms, alarm clocks, TV-speakers/music in bathrooms, iHome with iPods and radios, fixed and portable telephones, mini-bars, LCD TVs, coffee/tea making facilities, in-room electronic safes, cable/satellite channels, 24-hour net centres, hair dryers, Wi-Fi access in public areas, air conditioning and in-room Wi-Fi are rated by guests with a high level of importance and satisfaction. Based on the findings of this matrix, these technologies functionally increase guest satisfaction. Furthermore, video games on demand, CD/DVD players and voicemail are low in importance, but the associated guest satisfaction is rated high. Although customers are satisfied with these amenities, they are not extremely important to them.

4.3 Importance of the Latest Technologies

Regarding the 14 latest technologies, free HSIA in-room and in public areas, in-room tablets or iPads, a virtual concierge and an application for check-in, the option to choose the exact room and express check-out are perceived by respondents as the five most important technologies to enhance their hotel experience. Furthermore, respondents reported that self-service check-in and check-out kiosks in the lobby, guestroom lock access via guests' mobile phone, in-room interactive mirror/walls, in-room interactive table touch screens and in-room Xbox 360 consoles with a Kinect sensor were the five least important technological amenities to be available in a future hotel stay. Table 4 presents the mean and standard deviation of the importance level for technologies reported by respondents.

Insert Table 4 here.

Survey participants were asked to choose how they would like to check-in and check-out, to control their room or to make a service reservation. The majority of respondents (56.8%) would like to use digital options for the check-in process. Of these, 45.2% prefer to use a smartphone application, and only 11.6% reported a willingness to use a self-service check-in kiosk. Nevertheless, many hotel guests still prefer to go to the front desk to check-in (43.2%). However, the number of customers who prefer to go to the front desk to check-out is lower (26.5%). A smartphone application was the first option for check-out for almost half of the respondents (47.4%). A check-out system on TV and a self-service check-out kiosk were the other options selected by the respondents at 13.2% and 12.9%, respectively. Nearly one-half of the guests would like to use a tablet or iPad for room control, while slightly more than one-

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quarter would prefer a smartphone application (26.5%). Almost one-quarter of the sample (21.6%) would chose an interactive TV, while only 1.3% said they would like to use the traditional method of control by hand. Only 14% of the sample said the hotel room phone would be their first option when ordering room service or making service reservations. All other respondents (85.8%) stated that they would like to use digital options. Most of them (48.4%) would chose a tablet or iPad, and the second most frequent option is a smartphone application (31.3%). The remaining segment of the sample (6.1%) would chose an interactive TV as the preferred option of ordering room service. The results are summarised in Table 5.

Insert Table 5 here.

These results show that the availability of new guestroom technologies can influence guests' decisions when choosing a hotel. However, some customers are unwilling to pay extra for a guestroom with the latest technologies (27.1%), whereas the majority of the sample (54.5%) are willing to pay between €1 and €20 to have these. A smaller segment of the sample (14.2%) are willing to pay between €21 to €50 for these technologies, and only 4.2% of respondents said they would pay more than €50 extra. This result could be related to the fact that most guests assert that they are looking for unique or different experiences in terms of stay and facilities (73.2%), which can be achieved with guestrooms with the latest technologies.

4.4 Guests' Technological Preferences Across Purpose of Travel and Generation

In order to analyse how guest preferences differ according to purpose of travel, a one-way analysis of variance (ANOVA) was computed to estimate a model with the importance score for each technology as the dependent variable and the purpose of travel (i.e. leisure or business) as the independent variable. The data show that the following technologies are significantly more important for business travellers than for leisure guests: in-room tablets or iPads ($p < 0.05$; $F = 5.93$), in-room interactive TVs ($p < 0.05$; $F = 6.44$), free HSIA ($p < 0.05$; $F = 7.74$), guestroom lock access via mobile phone ($p < 0.05$; $F = 16.69$), an application for check-in and check-out ($p < 0.05$; $F = 9.36$), a mobile application to control the room ($p < 0.05$; $F = 8.34$), self-service check-in and check-out kiosks ($p < 0.05$; $F = 7.09$), free HSIA in public areas ($p < 0.05$; $F = 5.12$) and video conference and telepresence facilities in meeting rooms ($p < 0.05$; $F = 20.04$). Although both the business and leisure travellers identified free HSIA as the most important technological amenity in a hotel, the need for, and importance of, Wi-Fi service in hotels is higher for business travellers than for leisure guests. Therefore, the first hypothesis was verified, meaning that business travellers are more technologically demanding travellers than leisure guests are.

With the goal of analysing if there are differences in guests' preference according to generations, a one-way ANOVA was computed between generations (independent variables) and the importance score of each technology (dependent variable). First, the age groups were coded according to the generations to which they belonged. Therefore, respondents with ages between 18 and 34 were coded as Gen Y, those between 35 and 54 years old were coded as Gen X and, finally, respondents coded as baby boomers were those whose ages ranged from 55 to 64. The respondents who were older than 65 years old were not considered for this analysis. The results indicate that the importance score of the majority of the technologies are not significant across generations. However, since the results show that Xbox 360 consoles with a Kinect sensor ($p < 0.05$; $F = 5.70$), in-room interactive table touch screens ($p < 0.05$; $F = 3.69$), in-room interactive mirror/walls ($p < 0.05$; $F = 4.64$) and guestroom lock access via guests' mobile phone ($p < 0.05$; $F = 6.00$) are significantly more important for at least one

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generation, the null hypothesis was rejected for the technologies. Therefore, in order to understand which one of the generations is different for each technology, post hoc tests were performed. The results indicate that in-room Xbox 360 consoles, in-room interactive tables and in-room interactive mirror/walls are significantly more important for younger generations (i.e. Gen Y and Gen X) than for baby boomers. Therefore, the second hypothesis was supported.

5. Conclusions

Regarding the first objective of this study that focused on the 19 current technologies, the findings provide evidence that the following technologies have a significant impact on customer experiences: movies on demand, in-room TVs in bathrooms, alarm clocks, TV-speakers/music in bathrooms, iHome with iPods and radios, fixed and portable telephones, mini-bars, LCD TVs, coffee/tea making facilities, in-room electronic safes, cable/satellite channels, a 24-hour net centre, hair dryers, Wi-Fi access in public areas, air conditioning and in-room wireless Internet. These technologies are rated by guests as having high levels of importance and improving their satisfaction. Therefore, hoteliers need to keep these technologies with higher performance because these increase guest satisfaction and enhance customer experiences. Moreover, while guests do not consider the three remaining technologies (i.e. video games on demand, CD/DVD players and voicemail) extremely important, these are associated with high levels of satisfaction. This indicates that managers may want to consider reallocating the budget for these technologies to other amenities to which guests give more importance.

In relation to the second main objective of this study regarding the 14 latest technologies, the following five are perceived by guests as the most important technologies to enhance their experience: free HSIA in rooms and in public areas, in-room tablets or iPads, a virtual concierge and an application for check-in, choice of the exact room and check-out. This suggests that hoteliers need to invest in these technologies to offer a better experience to guests. Furthermore, customers rate self-service check-in and check-out kiosks in the lobby, guest room lock access via mobile phone, in-room interactive mirror walls, in-room interactive table touch screens and in-room Xbox 360 consoles with Kinect sensor as the five least important technological amenities to create a better experience. Since some of these technologies are not extremely common in either homes or hotels, guests may not see them as priority technologies in hotels at this time. However, while technologies that are not considered mainstream may be categorised as disruptive technologies by guests (Christensen, 1997; Cobanoglu, 2001), after these technologies become more common, the demand for them may increase, which can result in a competitive advantage for hotels. This may be an important consideration for hoteliers contemplating near-future technology investments. Disruptive technologies should not automatically be dismissed or ignored in strategic planning (Cobanoglu et al., 2011).

Concerning the guests' technological preferences for check-in and check-out, as well as ordering services or controlling their room, the majority of customers are interested in the digital world. Thus, hoteliers need to keep up with technological advancements to be able to maintain and acquire new guests. These results show that respondents have a strong desire to experience something genuinely new and that traditional methods used to update processes and technologies are no longer the way to exceed guests' expectations. In fact, a large

segment of customers (73.2%) are looking for a unique or different experience in terms of stay and facilities.

Differences in guests' technological preferences according to age and purpose of travel were also analysed. The findings reveal that the following latest technologies are more important for business travellers than for leisure guests: in-room tablets or iPads, in-room interactive TVs, free HSIA in rooms and in public areas, guestroom lock access via mobile phone, applications for check-in and check-out, a mobile application to control rooms, self-service check-in and check-out kiosks and video conference facilities in meeting rooms. Although HSIA is perceived by both business and leisure guests as the most important technology, the importance of HSIA is even higher for business travellers. This finding is consistent with previous studies (Lee and Tussyadiah, 2010; Bilgihan et al., 2011). This supports the conclusion that business travellers exhibit a greater desire to have digital involvement with the hotels in which they stay. Despite leisure guests' growing interest in technology, hoteliers need to consider some differences that still exist between business and leisure guests, as reported by Radder and Wang (2006), who found that business and leisure hotel guests have different wants, needs and travel patterns.

In terms of generational analysis, this study found that the importance level of same technologies (i.e. in-room Xbox 360 consoles, in-room interactive tables and in-room interactive mirror/walls) are significantly more important for younger generations (i.e. Gen Y and Gen X) than for baby boomers. However, as only three in 14 technologies present differences between generations, it can be concluded that baby boomers are open to new technologies, as confirmed by Yang and Jolly (2008). However, baby boomers are not usually early adopters because they are less comfortable with, and ready to use, some technologies (Eisner, 2005; LeRouge et al., 2014). Hotels should take into consideration that the latest technologies are more important for younger generations than for baby boomers. This finding is consistent with previous studies that reported Gen X and Gen Y are more technologically savvy than older generations are, because the former generations have grown up in a digital world (Morris and Venkatesh, 2000; Hanna, 2009; Schoch, 2012). As technology continues to change – along with guests' new desires – it is important to follow the evolution of the digital world, accompanied by an on-going study of customer feedback regarding new technologies, to identify what customers are looking for to enhance their hotel stay experiences.

When the interview and questionnaire results are compared, the conclusion is that manager and guest perceptions are aligned. Both indicate that technologies have a positive impact on guest experiences and that customers are satisfied. However, guests could be even more pleased with new technologies. Hotel managers think that business travellers continue to be more technologically savvy than leisure guests. Managers also report that technology has an impact on guests' decisions when choosing a hotel, which is consistent with the findings of the guest questionnaire. Hoteliers consider investing in new technologies important. According to the present study's findings, hoteliers identify 'enhancing customer experiences' as the main reason to invest in new technology. This is particularly important because the findings also suggest that technology is indeed an important way to enhance guest experiences. This validated information could be helpful for hoteliers who have invested or are investing in technology in their hotels.

5.1 Research Contribution and Managerial Implications

This study contributes to academic research because it upgrades information regarding the most important technologies currently available for guests and because it identifies the latest

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technologies that have a strong potential to enhance guest experiences. This study's results are also relevant since they focus on the perceptions of both managers and customers related to technology, providing a more comprehensive understanding of this phenomena.

The findings of this study can help hotel managers understand the impact of different technologies on guest experiences, providing guidance for hoteliers in upgrading or implementing new technologies that guests want to use during their hotel stay. Therefore, if hoteliers decide to follow the advice provided by this study, they can achieve greater differentiation by offering the most important amenities among the latest technologies to guests, enhancing the latter's experience and attracting new customers, which could potentially result in increased revenues.

5.2 Study Limitations and Future Research Directions

A limitation of this study was the difficulty in obtaining permission to administer the questionnaires in the selected hotels' lobby and the availability of guests to complete them. Another limitation was the small number of business travellers in the sample. Therefore, a study with an equal number of business travellers and leisure guests may provide different results.

Future research needs to ensure a heterogeneous sample in order to analyse the technology preference differences between leisure and business guests in greater depth. Future studies should also include a more segmented analysis to evaluate the results by the type of guests (e.g. family groups, couples, singles and friends) and by the frequency of their stay. A replication of this study with a larger sample needs to explore multi-national regions with advanced technology development, such as Europe and Asia, to investigate whether any variations in the perceived importance of technologies exist in different regions. Future research can also include other emerging technologies to examine differences among guest preferences for these technologies.

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Table 1. Selected studies on technological amenities in the tourism industry

References	Sample /Country	Technological Amenities	Statistical Methods
Cobanoglu et al., 2011	534 travellers USA	In-room VoIP service, in-room PPV movies, in-room voice-mail, in-room game system, in-room fitness system, in-room universal battery charger, in-room electronic safe, in-room guest control panel, in-room personal computer, mobile access to hotel website, electronic wireless key card, flat panel high definition television (TV), business centre, express check-in/check-out, in-room telephone, in-room alarm clock, easily accessible electronic outlets, in-room HSIA, wireless internet access in public areas.	Descriptive statistics, factor analysis, regression analysis
Bilgihan et al., 2011	408 travellers USA	HSIA, universal battery charger, guest-device connectivity, in-room desktop computer, in-room fitness, game console, promotional video, Internet on TV, music, free to guest TV, high definition TV	Factor analysis, *t*-test statistic
Jung et al., 2014	206 managers USA	Mobile applications, HSIA (free), HISA (with charge), Flat panel HD television, PPV in-room movie, mirror TV, VoIP/Internet protocol telephone, support for sling box, in-room entertainment systems, guest control panel, universal battery charger, docking stations for mobile devices.	Regression analysis
Usta et al., 2011	389 travellers USA	Phone in room, electronic key card, in-room temperature control, remote control TV, Good lighting to read/work, in-room coffee maker, alarm clock, fast online reservations, guest control panel, hair dryer, in-room check-out, wireless Internet access in hotel public areas, HSIA in the room, pay per view (movie system), radio, business centres, flat panel high definition TV, in-room electronic safety boxes, self-check-in, universal battery charger, in-room gaming system (i.e. Wii or PlayStation), VoIP.	Factor analysis, regression analysis, *t*-test statistic, descriptive statistics

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Technology	Features	Results
Self-service check-in and check-out kiosks	Guest check-in and check-out without waiting at the front desk	This simplifies, personalises and speeds up the process, allowing guests to go directly to their rooms (Weed, 2013).[1]
Application (mobile phone, computer or tablet) for check-in, choose the exact room and check-out	Possibility of checking in, choosing the room number and making special requests to customise stay (however, guests have to stop in the lobby to pick-up key); guest check-out through customers' devices and bill automatically sent to their email address	In 2014, Hilton Worldwide[2] was the first hotel company to provide this service, giving guests the ability to choose their exact room. In a recent Hilton survey[3] from the US, 84% of business travellers surveyed said they wanted the ability to choose their exact room. A few months after the launch of the room selection feature, one-third of eligible guests had already used the function and more than 90% were 'satisfied' or 'extremely satisfied' with the experience, saying they would use it again.
Guest room lock access via guest's mobile phone	Keyless entry system allowing guests to unlock doors with their smartphone without having to stop at front desk	In 2014, Starwood Hotels & Resorts Worldwide[4] was the first chain to introduce this system. A survey in 2013, with a sample of 1,000 travellers, concluded that 64% of them want to use a smartphone as a room key (Magnani Caruso Dutton, 2013).[5]

[1] http://www.hiltonworldwideglobalmediacenter.com/index.cfm/newsroom/detail/27701
[2] http://news.hiltonworldwide.com/index.cfm/newsroom/detail/27951
[3] http://news.hiltonworldwide.com/index.cfm/newsroom/detail/27192
[4] https://starwood.q4web.com/investor-relations/news/news-release-details/2014/Room-Key-20--Key-Card-Optional/default.aspx
[5] http://mcdpartners.com/wpcontent /uploads/2014/12/Seeing_Returns.pdf

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Interactive TV tablet/iPad smartphone	Internet access, control of room (i.e. heating systems, air conditioning, lighting, music, TV and curtains), orders of room service, reservation of rooms, digital concierge with personalised service, check-out and so on	In 2011, the Four Seasons Hotel Los Angeles at Beverly Hills was the first hotel in the world to launch the innovative Interactive Customer Experience™ (ICE) technology with iPad2 devices in all 285 guestrooms. The innovation was extremely successful since, with the ICE technology, this hotel increased customer experience, revenues and efficiency, which gave them a competitive advantage (Eftekari, 2014).[6]

Table 2. Latest technologies used by hotels

[1] http://www.hiltonworldwideglobalmediacenter.com/index.cfm/newsroom/detail/27701
[2] http://news.hiltonworldwide.com/index.cfm/newsroom/detail/27951
[3] http://news.hiltonworldwide.com/index.cfm/newsroom/detail/27192
[4] https://starwood.q4web.com/investor-relations/news/news-release-details/2014/Room-Key-20--Key-Card-Optional/default.aspx
[5] http://mcdpartners.com/wpcontent /uploads/2014/12/Seeing_Returns.pdf
[6] http://intelitycorp.com/main/?portfolio=ice-at-four-seasons-los-angeles-beverly-hills

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Free HSIA	High speed Internet access for free in-room and in public areas	A study of 1.2 million guests concluded that 71% of guests consider the speed of their Internet connection a key factor in their choice of hotel (iBAHN, 2011). In another survey with 1,800 hotel guests, 89.6% said that in-room Internet is extremely important, and 66.5% stated that in-room Internet affects their decision when choosing a hotel (Hotel Internet Services, 2010).[7] Wireless Internet is the most important amenity as compared with items such as complimentary breakfast, bedding and pillow choices, pillow top mattress and free parking (Greif, 2010).[8]
Xbox 360 console	Kinect sensor that uses body gestures and voice recognition to control games and entertainment	Novotel decided to implement a pilot phase in which the Xbox 360 was tested as in-room entertainment in six of its European hotels. This new concept was a success, as proved by the high satisfaction rate among guests (81%).[9]
Virtual concierge	Touch screen with all information about city – restaurant tips, flight arrivals and departures and driving directions – via device to guests	In June 2013, Novotel launched its virtual concierge. After one month of use, the guest feedback was already positive. Novotel had significant increases in guests' satisfaction levels and reported high levels of adoption across all target demographics.[10] This service has been a success, and it is used by guests to find activities near the hotel (36%), calculate itineraries (20%) or consult weather forecasts (17%).
In-room interactive table	Touch screen with Internet games and various multimedia applications	By the end of June 2014, Novotel's Web 3.0 hotel experience included the latest innovative technology – the PLAY multimedia table, which has been tested in 12 pilot lobbies worldwide.[11]
In-room interactive mirror/wall	A host of applications (e.g. go to Internet, watch movies and personalise room with photos)	In November 2011, Novotel Paris Vaugirard Montparnasse opened a pilot room named Room 3120 with an interactive Sensorit mirror that looks like a magic wall and that is also based on Kinect technology for Windows.[12]

[7] http://www.hotelwifi.com/news/hotel-wifi-survey-2.pdf
[8] http://www.hotelnewsnow.com/Articles.aspx/3944/Hotel-guests-put-Wi-Fi-at-top-of-amenity-list
[9] http://www.accorhotels-group.com/en/news/novotel-includes-the-xbox-360-experience-in-its-hotel-rooms.html
[10] http://www.accorhotels-group.com/fileadmin/user_upload/Contenus_Accor/Presse/Pressreleases/2013/EN/monscierge_novotel_release_for_hitec_rf_en.pdf
[11] http://www.accorhotels-group.com/fileadmin/user_upload/Contenus_Accor/Presse/Pressreleases/2011/EN/141111_PR_Novotel_Mino_Room_en.pdf
[12] https://starwood.q4web.com/investor-relations/news/news-release-details/2014/Room-Key-20--Key-Card-Optional/default.aspx

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Table 3. Cross-checking – *t*-test (importance-satisfaction)

Technology	N	Importance	Satisfaction	Correlation	*t* [1]
1. Liquid crystal display television	288	5.32	5.99	0.317	-6.843***
2. CD/DVD player	78	3.42	4.77	0.413	-5.326***
3. Cable/satellite channels	274	5.50	5.80	0.221	-2.856***
4. Video games on demand	55	2.56	3.93	0.103	-3.957***
5. Movies on demand	80	3.69	4.60	0.428	-3.625***
6. Mini-bar	194	4.75	5.62	0.313	-6.462***
7. Alarm clock	109	3.94	5.19	0.423	-5.993***
8. iHome with iPod and radio	82	4.32	5.05	0.264	-2.566***
9. Air conditioning	289	6.48	6.34	0.275	1.911*
10. Wireless Internet	285	6.64	5.85	0.042	8.357***
11. Fixed and portable telephones	141	4.57	5.40	0.314	-4.675***
12. Voicemail	75	3.49	4.67	0.286	-4.117***
13. In-room electronic safe	155	5.37	5.67	0.422	-2.058**
14. TV-speakers/music in bathroom	115	4.31	5.23	0.336	-4.142***
15. Hair dryer	238	5.66	5.53	0.256	0.985
16. In-room TV in bathroom	60	3.95	4.48	0.466	-1.709*
17. Coffee/tea making facilities	154	5.30	5.78	0.285	-3.062***
18. Wireless Internet access in public areas	254	6.48	5.83	0.080	6.046***
19. 24-hour net centre	130	5.61	5.55	0.181	0.321

[1] Statistically significant at the ***1%, **5% and *10% level

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Table 4. Importance of latest technological amenities

Latest technological amenities	Mean	Std. deviation
Free in-room HSIA	6.51	1.02
Free HSIA in public areas	6.35	1.07
In-room tablet or iPad	5.32	1.79
Virtual concierge in lobby	5.24	1.68
Application for check-in, selection of exact room and check-out	5.17	1.80
In-room interactive TV	4.99	1.70
Mobile application that enables guest to control room	4.89	1.82
In-room check-out system through TV	4.54	1.79
Video conference and telepresence in meeting rooms	4.43	1.94
Self-service check-in and check-out kiosks in lobby	4.40	1.77
Guestroom lock access via guest's mobile phone	4.27	2.00
In-room interactive mirror/wall	3.56	1.91
In-room interactive table touch screen	3.37	1.79
In-room Xbox 360 console with Kinect sensor	2.25	1.67

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Table 5. Technological preferences for check-in/out, room control and service orders

If you had all the following options available to you, which one would you prefer to use?		N	%
Check-in	Front desk	134	43.2%
	Self-service check-in kiosks	36	11.6%
	Smartphone application	140	45.2%
Check-out	Front desk	82	26.5%
	Self-service check-out kiosks	40	12.9%
	Smartphone application	147	47.4%
	Check-out system through TV	41	13.2%
Room control	**Tablet or iPad**	157	50.6%
	Smartphone application	83	26.5%
	Interactive TV	67	21.6%
	Traditional method – by hand	3	1.3%
Order room service or make service reservation	Hotel room phone	44	14.2%
	Tablet or iPad	150	48.4%
	Smartphone application	97	31.3%
	Interactive TV	19	6.1%

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