Importance-Performance Analysis of Guest Entertainment Technology Amenities in the Lodging Industry

By Anil Bilgihan, Cihan Cobanoglu and Brian L. Miller

An assessment of how hotel guests view in-room entertainment-technology amenities was conducted to compare the importance of these technologies to how they performed. In-room entertainment technology continues to evolve in the hotel industry. However, given the multitude of entertainment products available in the marketplace today, hoteliers have little understanding of guests' expectations and of which in-room entertainment-technology amenities will drive guest satisfaction and increase loyalty to the hotel brand. Given that technology is integral to a hotel stay, this study seeks to evaluate the importance and performance of in-room entertainment-technology amenities. Findings indicate that free-to-guest television (FTG TV) and high-speed Internet access were the two most important in-room entertainment-technology amenities when it comes to the selection of a hotel for both leisure and business travelers. The Importance/Satisfaction Matrix presented in the current study showed that many of the in-room entertainment-technology amenities are currently a low priority for guests.
Keywords: importance-performance analysis, hotel, in-room entertainment technologies

INTRODUCTION

Travelers have many choices among hotels. In this highly competitive environment for travelers, lodging managers should understand their guests' needs in order to keep current customers and attract new customers (Ananth, DeMicco, Howey, & Moreo, 1992; Howell, Moreo, & DeMicco, 1993; Sammons, Moreo, Benson, & DeMicco, 1999). Many lodging companies use technology as a value-added service to their guests. When deploying technology as a value-added service, hotels can create differentiation, enhance guest satisfaction, and build lasting loyalty among customers (Cobanoglu, Ryan, & Beck, 1999). Contemporary travelers demand technology applications and amenities before, during, and after their stay in hotels (Collins & Cobanoglu, 2008).

Olsen, Connolly, and Allegro (2000) suggested that information technology is the single greatest force driving change in the hospitality industry and will continue to alter the way the industry conducts business in the future, regardless of property size, segment, or geographic location. In this regard, it has become important to continue to identify the amenities, services, and technology applications that guests demand from hotels. Such investigations enable managers to offer a meaningful set of guestroom technology applications to guests. Technology evolution has been significant, and these developments are coming at ever increasing speeds. Thus there is a plethora of multimedia entertainment products for

home, work, and on the go. Since customers have options when choosing hotel, they may be increasingly expecting a wider variety of choices for entertainment in their hotel rooms. However, most hotels are indecisive about offering the latest technology to their customers (Deeb & Murray, 2002). These improvements in multimedia entertainment over the last few years has resulted in an increased acceptance by consumers and now may heighten the importance of in-room entertainment offerings in hotels as today's luxury amenities become tomorrow's expectation (Boukis, 2007). Moreover, in-room entertainment services are a potential revenue-producing opportunity for hotels that allows for customized guest experiences.

In-room entertainment technology amenities include personalized welcoming messages on HD televisions, video on demand, high-speed wireless Internet, interactive TV systems, video games, in-room fitness, and many more. Hoteliers are beginning to invest in in-room entertainment-technology amenities in an effort to gain market share (Beldona & Cobanoglu, 2007). Given that technology is integral to a hotel stay, this study seeks to evaluate the importance and performance of in-room entertainment-technology amenities.

RESEARCH OF THE USE OF TECHNOLOGY IN HOTELS

Recent industry initiatives have placed home-based technologies in hotel rooms in an effort to keep pace with the technologies used by consumers at home (Beldona & Cobanoglu, 2007). According to Brewer, Kim, Schrier, and Farrish (2008), hoteliers increase revenues and enhance the guest experience with technology applications. However, the lodging industry is often criticized for being slow to implement up-to-date technology, an accusation that seems to apply to guest rooms more than to overall operations (Price, n.d.). To address this issue, an industry forum of technology experts came together to start the "In-Room Technology Workgroup," whose aim is to develop ideas for the guest room of the future (Hotel Technology Next Generation, 2010).

The academic literature has generally come to the conclusion that the lodging industry would rather implement technologies that improve employee productivity and enhance revenue rather than focus on technologies that improve the guests' in-room experience (Siguaw, Enz, & Namasivayam, 2000). This perception is supported by a study of South Korean hotel managers that found the managers believed that guest technologies have only a marginal impact on hotel performance (Ham, Kim, & Jeong, 2005). Furthermore, an earlier study reported that hotel

managers believed that guests do not use guest-operated devices effectively (Van Hoof, Verbeeten, & Combrink, 1996). Conversely, more recently, Singh and Kasavana (2005) concluded that guests expect to find technologies in their hotel rooms that mirror those that they use in their daily lives.

The general findings reported in the academic literature suggest that the hotel industry is slow to adopt guestroom technologies (Van Hoof et al., 1995; Deeb & Murray, 2002; Beldona & Cobanoglu, 2007), because hotel operators and managers perceive that expenditures on in-room entertainment-technology amenities do not yield a positive return on the investment. The challenge for the lodging industry is determining when a potential new technology is sufficiently accepted by consumers in their daily experience and thus should be implemented in hotel guest rooms. According to Beldona and Cobanoglu (2007), the technology-adoption life cycle functions as an important framework in determining the feasibility of the implementation of a technology decision. Additionally, novelty theory serves as a guideline for consumers' evaluation for monitoring the performance of existing technologies.

Technology Adoption Life Cycle

The technology-adoption life cycle is used for classifying the market and its reaction to a high-tech product. Consumers are likely to separate themselves along an axis of increasing sensitivity to risk. Consumers fall into one of five basic classifications: innovators, early adopters, early majority, late majority, or laggards (Rogers, 1995). Every consumer adoption class has a different set of needs and reactions to innovations. As a result, each group has different expectations. Moore (1991) compared the general population's transition from introduction to acceptance of a technology, to crossing the chasm. Often there is a significant gap between the consumers in the early market and consumers in the early majority, so technology products frequently fall into the chasm that is marked by a decrease in sales and a loss of market share. Thus many new technology products are likely to fail (Meadea & Rabelo, 2004).

The technology-adoption life cycle is often used for analyzing the extent that technology becomes integral to a product's definition, e.g., the in-room television in the lodging industry. In the 1960s, hotels used to charge guests for the inclusion of a television in their rooms. Additionally, properties marketed the presence of televisions in their guest rooms as a competitive advantage. Over time, the television become a standard, expected amenity for guestrooms. Similarly, Internet access in

guestrooms is often an extra charge to guests who use this service. Again, over time, it is expected that the additional charges for access to in-room Internet will disappear throughout all hotel segments (Beldona & Cobanoglu, 2007).

Technology life cycle is a framework that elucidates the evolution of technology. It outlines a variety of stages in the progression that a technology might experience in the market. There are four stages in the cycle: introduction, growth, maturity, and decline. This framework may be applied to a specific technology or a version or generation of a technology. Relevant to hoteliers is not the stage of the technology life cycle so much as the stage of who is adopting that technology, as characterized by the closely related technology adoption life cycle. Similarly, Parasuraman, and Colby (2001) characterized five segments in the adoption process: explorers, pioneers, skeptics, paranoids, and laggards. In their taxonomy the attributes and attitudes of each segment differ based on a combination of optimism, innovativeness, discomfort, and insecurity toward the technology (Beldona & Cobanoglu, 2007). Over time, all of the segments typically develop to become a viable customer group. However, the process does not necessarily occur in a distinct order, even though the categorization provides guidelines for customer segmentation. Although an important characteristic of the technology-adoption life cycle is that innovators (explorers) followed by early adopters (or pioneers) need to adopt the technology before it can move to the next stage of distribution in a more extensive market. Early adopter segments have higher standards in technology evaluation. Early adopters are technological-performance oriented, whereas later adopters mainly seek solutions and convenience (Norman 1998; Parasuraman & Colby 2001).

The core product of the lodging industry is the accommodation, which is the hotel's key benefit or solution when addressing specific consumer needs (Kotler, Bowen, & Makens, 2003). The actual product is composed of the features and attributes, combined as the brand, which is designed to deliver the core product benefit. Crossing the chasm of implementing technology in guest rooms involves identifying the correct moment when the adopted technology becomes a part of the lodging product. On the early side of the chasm, the augmented product is composed of services and benefits that are beyond the core and actual product. They are not automatically expected but may be appreciated by some guest segments. For instance, high-speed Internet (HSAI) has been a part of the augmented lodging product for some time. However, lately, HSIA has become a mainstream technology so hotel operators should

consider whether the offering of Internet access has in fact crossed the chasm in their industry and should therefore become part of their actual product.

Given this situation, the way hotels package in-room entertainment technology amenities and how they charge for it, will change as these technologies become widely accepted into guests' daily activities. This prediction, supported by the American Hotel and Lodging Association's *2008 Lodging Survey* findings, is that the number of hotels charging for in-room Internet service is steadily decreasing. In the 2008 report, 16% of respondents stated that they charged for in-room Internet service, which is a down from 19% in 2006 and 22% in 2004 (AH&LA, 2008). Similarly, on a micro level, the Sheraton Delfina in Santa Monica, CA, reportedly charged $15 per hour for an iPod service when it was introduced to their guests but now is providing the iPod service free to guests during the entire stay (Mollman, 2007).

Novelty and Technology

The extensive technological innovation literature describes the novelty of technology on the basis of degree of familiarity with a given technology (Tatikonda & Rosenthal, 2000). Novelty theory suggests that some hotel guests will look for technology out of curiosity (Hirschman, 1980). Predictably, the novelty effect is reduced with frequent use. At the same time, as the novelty vanishes, the user is expected to become more capable in using the technology. As the proficiency in using technology increases, a tougher standard of evaluation of the relatively old technology is employed, especially when compared along with the evaluation of newer technologies (Beldona & Cobanoglu, 2007). In the current study, the novelty effect was considered when conducting the analysis of the importance and performance of in-room entertainment technologies.

In-Room Entertainment Technologies

The hospitality industry has witnessed remarkable technological changes from the late 1980's to today. In-room entertainment-technology amenities offer the "home away from home" comfort in guestrooms. Historically, hotel guests would experience new technologies in hotels before they were available in the mainstream of society (Beldona & Cobanoglu, 2007). Due to the rapid advances in technological innovation and the shortening of time for these innovations to come to the mass market, hotels are now challenged to supply an experience as good as or better than guests have available in their homes.

The colossal development of multimedia entertainment products over the last few years reflects the acceptance and importance of in-room entertainment offerings in hotels. The diversity of amenities may consists of personalized welcoming message on the HD television, video on demand, high speed Wi-Fi, interactive TV systems, video games, in-room fitness, and so forth. In-room entertainment systems provide guests access to a variety of forms of entertainment and information when they want it and on the device of their choosing.

Methodology

Research Instrument

A self-administered questionnaire was created from information obtained from a review of the literature. The questionnaire was piloted to travelers to test its efficacy and clarity. Revisions to the questionnaire were made based on the recommendations of the respondents.

The final instrument had two sections. In the first section, participants were asked to rate the importance of and satisfaction with in-room entertainment-technology amenities. These in-room entertainment-technology amenities were adopted from the works of Beldona & Cobanoglu (2007); Cobanoglu (2001); and Cobanoglu, Corbaci, Moreo, and Yuksel, (2003). To measure the importance of the in-room entertainment-technology amenities, the following five-point Likert-type scale response format was used (5 = Very important, 1= Not important at all). To measure satisfaction with in-room entertainment technology amenities, the following five-point Likert-type scale response format was used (5= Very satisfied, 1= Not satisfied at all). The decision to use a five-point scale was to reduce respondent frustration and improve the accuracy of the responses (Shifflet, 1992). The second section of the survey consisted of demographic questions regarding gender, marital status, age, educational background, and job title. This study employed an online-survey methodology. The target population consisted of U.S. travelers. The sample used in this study consisted of 2,500 U.S. citizens who had email addresses drawn randomly from a national database company. Data were coded and analyzed using The Statistical Packages for Social Sciences 17 (SPSS, 2009).

Data Analysis

Exploratory factor analysis with VARIMAX rotation was employed on the data from the perceived importance of the 14 in-room entertainment-technology amenities of the survey respondents. The primary objectives of using a factor analysis were: (1) to create correlated

variable composites from the original 14 in-room entertainment-technology amenities so as to identify a smaller set of dimensions or factors that explained most of the variances among the attributes; and, (2) to apply the derived factors in the subsequent importance performance analysis (IPA). The determination of including a variable (attribute) in a factor was based on the factor loadings, eigenvalues, and the percentage of variance explained (Hair, Anderson, & Black, 1995). First, the factor loadings represent the correlation between an original variable and its respective factor, and only factor loadings equal to or greater than 0.50 were included as a factor. Second, only factors with eigenvalues equal to or greater than 1 were considered significant. The reasoning for this was that an individual factor should account for at least the variance of a simple variable. Finally, the result of the factor analysis should explain at least 60% of the total variance. To assess the reliability of the measures, Cronbach's Alphas were calculated to test the stability of variables retained in each factor, and only those variables having coefficients greater than or equal to 0.50 were considered acceptable and a good indication of construct reliability (Nunnally, 1967).

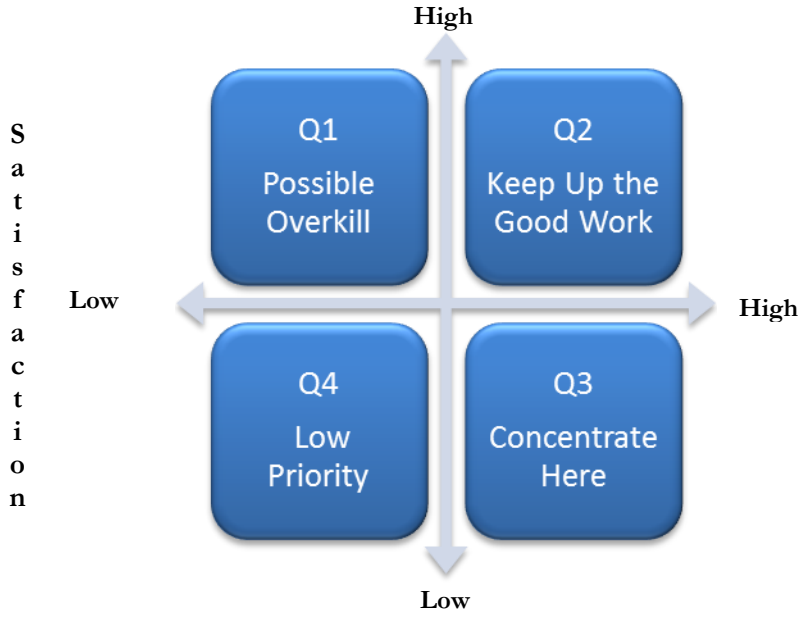
The main analysis of the current study involved the importance performance analysis (IPA). This tool allowed us to create a two-by-two matrix of the relative positioning of the in-room entertainment technology amenities, based on high or low importance and high or low performance (satisfaction). Importance-performance analysis yields important insights into which aspects of the marketing mix a firm should devote more attention to, and it identifies areas that may be consuming too many resources (Martilla & James, 1977).

There are plenty of examples of researchers who have employed importance performance analysis (IPA) in tourism research literature (Zhang & Chow, 2004; Deng, 2007; Tonge & Moore, 2007; Chang & Yang, 2008; Frauman & Banks, 2010) to pinpoint the difference between customer satisfaction and perceived importance. Hansen and Bush (1999) indicated that IPA is a simple and effective technique that can help researchers in identifying improvement priorities for customer attributes and direct quality-based marketing strategies. Practitioners implement IPA to analyze two dimensions of customer attributes: performance level (satisfaction) and importance to customers.

Central to the analysis, the importance-performance matrix is divided into four quadrants, distinguishing between low and high importance and between low and high performance (satisfaction) (Figure 1). The location of the cross-hairs that divide the matrix into quadrants is

critical to the interpretation of the results. As Martilla and James (1977) suggested, the means for importance and satisfaction of attributes of the derived factors were used as cross-hairs. Quadrant I displays amenities that are of low importance but respondents were highly satisfied. Quadrant II includes those amenities that are important to travelers and on which they responded that they were highly satisfied. Quadrant III indicates the area in which amenities are important to travelers but on which they responded that their satisfaction was low. Finally, Quadrant IV includes amenities that are low in both importance and satisfaction. A paired t-test was conducted to test the differences between the importance and performance of in-room entertainment.

Figure 1
Importance-Performance (Satisfaction) Grid



Initially, 1,812 respondents accessed the online survey; however, the first question of the survey asked whether respondents had stayed in a hotel in the past 12 months. If the respondent selected "No" as a response, the survey was terminated. There were 749 surveys for which the respondents had not stayed in a hotel in the past 12 months. Additionally, 655 surveys were initiated but not completed. In the end,

data analysis was conducted from 408 completed surveys for a response rate of 16.3%.

RESULTS AND DISCUSSION

The survey was completed by 124 male respondents (30.4%) and 395 female respondents (66.4%). The majority of the male respondents were married with children (40.0%), while 21.3% of females were single. Almost 30% of the respondents were between 35 and 44 years old and more than 20% of respondents were between 45 and 54 years old. There were few respondents younger than 25 (10.7%) or older than 65 (2.2%).

In terms of educational background of respondents, 134 (32.7%) respondents had obtained at least a bachelor's degree, while 125 (30.6%) respondents indicated that they had some college preparation. Only 3 (0.7%) of the respondents had earned a doctorate degree. The most frequently cited occupations reported were management, professional, and related occupations. The majority of respondents in the current study (69.4%) travelled mostly for leisure purposes, while 30.6% of the respondents travelled mostly for business.

Respondents were asked to state the degree to which they adopted new technologies. About 23% of respondents reported that they were early adopters of technology compared to 6.2% reporting they were laggards. In the current study 71% of respondents were in the middle, between early adopters and laggards.

Hotel Selection Factors Derived from Factor Analysis

The perceived importance of the 14 in-room entertainment-technology amenities were analyzed using principal component analysis with orthogonal VARIMAX rotation, to identify the underlying dimensions, or hotel selection factors. The exploratory factor analysis was conducted in order to gain a better understanding of the underlying structure of the data (Pitt & Jeantrout, 1994). It also served to simplify the subsequent IPA procedures. The results of the factor analysis, which suggested a three-factor solution, included 14 in-room entertainment technology amenities and explained 61.41% of the variance in the data with eigenvalues greater than 1.0 and factor loadings greater than 0.50. The factor analysis in this study proved to have acceptable validity with the following five observations. First, Nunnally (1978) recommended at least 10 cases for each variable to be factor analyzed. In this study, all of the variables had more than 10 cases. Second, the result of the one-tailed significance test of the correlation matrix showed that more than 50% of correlation coefficients were greater than 0.30 in absolute value, indicating

that the inter-correlations among the 14 attributes were strong (Noursis, 1994). Third, the overall significance of the correlation matrix was 0.000 with a Bartlett Test of Sphericity value of 2839.616, suggesting that the data matrix had sufficient correlation to the factor analysis. It appeared unlikely that the population correlation matrix was an identity and the use of factor analysis was considered appropriate. Fourth, the Kaiser-Meyer-Olkin (KMO) overall measure of sampling adequacy was 0.898, which was meritorious (Kaiser, 1974). Since the KMO value was above 0.80, the variables were interrelated and they shared common factors. Lastly, the communalities ranged from 0.49 to 0.89 with an average value above 0.61, suggesting that the variance of the original values was explained mostly by the common factors. The results of the factor analysis produced a clean factor structure with relatively higher loadings on the appropriate factors. Most variables loaded heavily on one factor, and this reflected that there was minimal overlap among factors and that all factors were independently structured. The higher loadings signaled the correlations of the variables with the factors on which they were loaded. Reliability analysis (Cronbach's Alpha) was conducted to test the reliability and internal consistency of each factor. The results showed that the Cronbach's Alpha coefficients of the three factors ranged from 0.89 to 0.92, well above the minimum value of 0.50 that is considered acceptable as an indication of reliability for basic research (Nunnally, 1967). Table 1 shows the results of the factor analysis in terms of the factor name, the retained items, the factor loadings, the eigenvalues, the variance explained by the factor solution, the communalities, and the Cronbach's Alphas. The three in-room entertainment-technology amenity factors were named: Business Entertainment Amenities (F1); Pure Entertainment Amenities (F2); and TV Amenities (F3).

Table 1
Results of factor analysis for in-room entertainment technology amenities

	Dimensions		
	Business Entertainment Amenities	*Pure Entertainment Amenities*	*TV Amenities*
High speed internet access	.77		
Universal battery charger	.71		
Guest-device connectivity	.68		
In-room desktop computer	.65		
In-room fitness	.56		
Game Console #1		.88	
Game Console #2		.87	
Game Console #3		.87	
Promotional Video		.64	
Internet on TV		.63	
Music		.56	
Free to guest TV			.88
High Definition TV			.81
Eigenvalue	5.98	1.56	1.40
Variance Explained	42.77	11.18	7.44
Cumulative Variance Explained	42.77	53.96	61.41
Cronbach's Alpha	.92	.89	.91

N=408; The Kaiser-Meyer-Olkin (KMO) statistic = 0.898; Bartlett's Test of Sphericity = χ=2839.616, df=91, Sig.=.000.

Importance of In-Room Entertainment-Technology Amenities to the Selection of a Hotel

Survey participants were asked to rate the importance of in-room entertainment-technology amenities in the selection of a hotel. Table 2 presents the means and standard deviations for the attributes as reported by respondents as the level of importance for leisure travelers.

Table 2
In-room entertainment technology amenity's importance-satisfaction for the selection of a hotel

	Importance				Satisfaction			
	Leisure		Business		Leisure		Business	
Guestroom Amenities	M[1]	SD[1]	M[2]	SD[2]	M[3]	SD[3]	M[4]	SD[4]
Business Entertainment Amenities (F1)	2.94	1.17	3.30	0.973	3.54	1.26	3.40	1.19
HSIA (High Speed Internet Access)	3.88	1.518	4.4	1.055	3.82	1.343	3.72	1.266
Universal Battery Charger	2.76	1.622	2.98	1.581	3.68	2.53	4.771	1.212
Guest Device Connectivity	3.25	1.623	3.77	1.487	3.62	1.343	3.58	1.268
In Room Desktop Computer	2.6	1.558	2.86	1.593	3.46	1.319	3.42	1.297
In Room Fitness	2.25	1.45	2.49	1.474	3.25	2.73	4.608	1.284
Pure Entertainment Amenities (F2)	1.96	0.985	2.05	.0997	3.20	1.28	3.15	1.27
Game Console #3	1.66	1.141	1.76	1.18	3.16	3.09	4.539	1.391
Game Console #1	1.79	1.228	1.91	1.301	3.22	2.93	4.593	1.425
Game Console #2	1.73	1.245	1.74	1.144	3.21	3.09	4.568	1.365
Promotional Video	1.61	1.041	1.84	1.247	3.01	1.541	2.96	1.512
Internet on TV	2.22	1.457	2.22	1.495	3.24	1.566	3.09	1.551
Music	2.76	1.485	2.89	1.546	3.56	1.366	3.49	1.356
TV Amenities (F3)	3.27	1.09	3.36	1.03	3.99	1.03	3.85	1.16
Free-To-Guest (FTG) TV	4.1	1.339	4.14	1.272	4.23	0.986	3.97	1.196
High Def TV	2.45	1.424	2.58	1.514	3.38	2.81	4.579	1.341

Notes: M1 Mean for Leisure Travelers (1=Not important at all, 5=Very Important) N=408
M2 Mean for Business Travelers (1=Not important at all, 5=Very Important)
SD1 Standard Deviation for Leisure Travelers, SD2 Standard Deviation for Business Travelers
M3 Mean for Leisure Travelers (1=Not satisfied at all, 5=Very Satisfied)
M4 Mean for Business Travelers (1=Not satisfied at all, 5=Very Satisfied)
SD3 Standard Deviation for Leisure Travelers, SD4 Standard Deviation for Business Travelers

High-speed Internet access in the guestroom, and guest device connectivity were perceived as more important by business travelers than by leisure travelers. Generally speaking, free-to-guest television (FTG TV) and high-speed Internet access are the two most important in-room entertainment technology amenities when it comes to selecting a hotel for both leisure and business travelers. Moreover, respondents reported that promotional video was the least important in-room entertainment technology amenity in the guestroom by both traveler groups. Overall, based on the current results, in-room entertainment technology amenities were rated similarly by both leisure and business travelers.

An independent t-test was conducted on the means of importance of in-room entertainment- technology amenity factors between business and leisure travelers. The importance of business entertainment amenities (F1) was found to be significantly different across business (3.30) and leisure travelers (2.94). This makes sense given the importance of business-related amenities, such as high-speed Internet access, guest device connectivity, and universal battery charger. The importance scores of other amenities were not found to be significantly different between business and leisure travelers.

Satisfaction with In-Room Entertainment Technology Amenities

Survey participants were asked to rate their satisfaction level with in-room entertainment-technology amenities at the last hotel they had stayed in over the preceding 12 months. Additionally, for this question respondents had a "not available" option for the satisfaction if they did not have experience with the technology in the last hotel where they had stayed. Responses that were selected as "not available" were eliminated from the current data analysis. An independent t-test statistic was calculated to determine whether there were significant differences in satisfaction with in-room entertainment-technology amenities as reported by leisure and business travelers. The results are presented also in Table 2. There were no statistical differences between the satisfaction scores of in-room technology amenity factors between business and leisure travelers. The reason for this finding may be that technology is becoming part of travelers' lives, as these technologies are easily available and are in daily use in our society. Thus, leisure and business travelers have similar experiences with technology regardless of their travel purpose.

Importance-Performance Gap Analysis

Survey participants were asked to rate the importance of and satisfaction with guestroom technology amenities when staying at a hotel.

A paired t test was used to test the significant mean difference (gap) between respondents' perceptions of importance of and satisfaction with (Table 3) in-room entertainment- technology amenity factors.

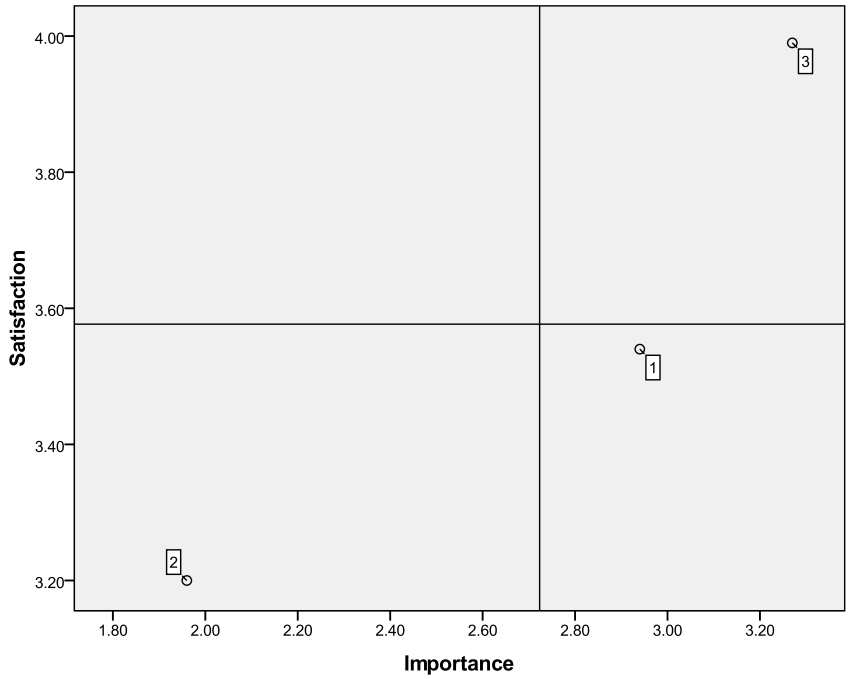
Table 3
Importance-performance gap analysis (N=408)

	Importance		**Satisfaction**				
Guestroom Amenities	M[1]	SD[1]	M[2]	SD[2]	Dif.[3]	*t*[4]	Sig.[5]
Business Entertainment Amenities (F1)	3.20	1.02	3.49	1.24	-0.28	*-3.480*	0.001*
HSIA (High Speed Internet Access)	4.41	1.041	3.79	1.316			
Universal Battery Charger	3.62	1.361	3.19	1.559			
Guest Device Connectivity	3.98	1.267	3.61	1.317			
In Room Desktop Computer	3.4	1.411	2.99	1.528			
In Room Fitness	3.1	1.39	3.32	1.395			
Pure Entertainment Amenities (F2)	2.42	0.99	3.18	1.27	-0.76	*-7.181*	0.000*
Game Console #3	2.4	1.377	3.11	1.412			
Game Console #1	2.6	1.415	3.17	1.411			
Game Console #2	2.48	1.454	3.07	1.439			
Promotional Video	2.29	1.277	3.26	1.356			
Internet on TV	3.09	1.455	3.26	1.347			
Music	3.41	1.29	3.45	1.31			
TV Amenities (F3)	3.42	0.95	3.94	1.07	-0.51	-7.600	0.000*
Free-To-Guest (FTG) TV	4.34	1.047	4.15	1.063			
High Def TV	3.18	1.3828	3.54	1.15			

Significance *= $\alpha \leq 0.001$

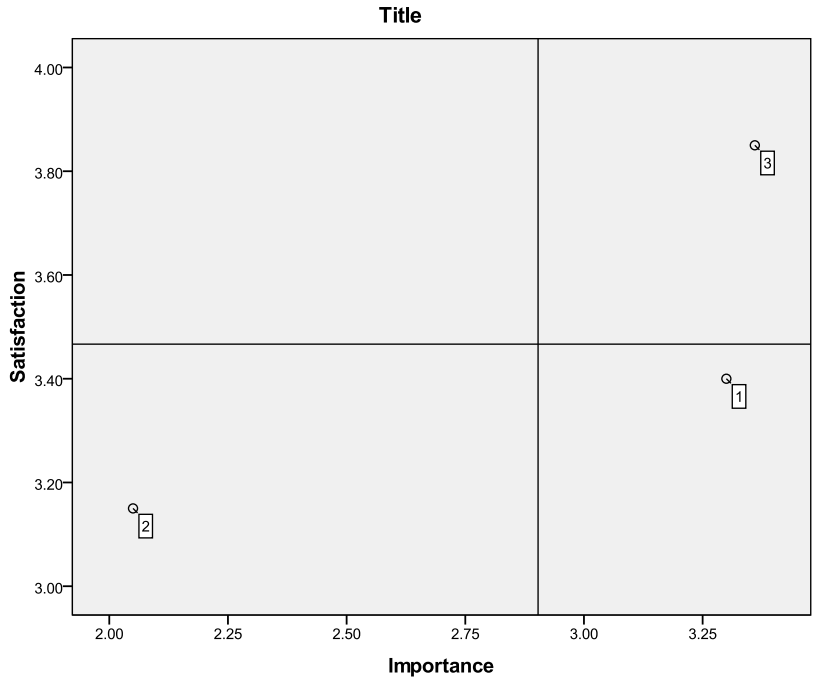
The t-statistics presented in Table 3 show that the means from the respondents' importance and satisfaction was significant for each of the factors. In each of the factors, the satisfaction score was significantly higher than the importance score for both types of travelers. To understand the importance and satisfaction of each factor better, an importance-performance matrix was created (See Figures 3 and 4).

Figure 3
Importance-Performance Analysis
Grid for Leisure Travelers



1 Business Entertainment Amenities (F1)
2 Pure Entertainment (F2)
3 TV Amenities (F3)

Figure 4
Importance-Performance Analysis
Grid for Business Travelers



1 Business Entertainment Amenities (F1) 2 Pure Entertainment (F2)
3 TV Amenities (F3)

Importance-Performance Matrix

In the importance-performance matrix, respondents' rankings of the in-room entertainment- technology amenity factors for both importance and satisfaction are plotted on a grid with four quadrants. Each of the quadrants represents how important the in-room entertainment technology amenity was relative to the perceived satisfaction by business and leisure travelers. With this matrix, it is possible to identify where there are gaps (i.e., the amenity is high in importance but low in satisfaction). The following presents the results of this analysis. In the first quadrant, (Possible Overkill), there were no factors present.

Keep Up the Good Work Quadrant

Quadrant II (keep up the good work) has in-room entertainment technology amenities that were important to travelers and were high in satisfaction. The TV amenities factor fell into this quadrant for both business and leisure travelers. However, the TV amenities factor was ranked significantly more important by leisure travelers, who were significantly more satisfied than business travelers. Resources should continue to be directed to ensuring that the quality of TV systems in hotels is high. Currently many hotels are in the process of switching old TV systems to HDTV systems. Several hotel chains required all hotels under their brand to switch to HDTV by a certain deadline (Stoller, 2010). This trend appears to be in line with this finding. The technology life cycle is often used for analyzing the extent to which technology has become integral to the product's definition. This finding attests to the fact that HDTV is being adopted beyond the innovators (explorers) and early adopters (pioneers), thereby progressing it in the technology life cycle. However, hoteliers need to be careful to offer high definition TV channels along with the implementation of HDTVs. Not doing so may limit the satisfaction among hotel guests (Stoller, 2010).

Quadrant III: Concentrate Here

Quadrant III (concentrate here) includes in-room entertainment-technology amenities that were rated important to travelers but whose satisfaction was rated as low (as compared to the means of each group). In the current study, Quadrant III captured only the business-entertainment amenities factor for both business and leisure travelers. It seems that amenities that are found in this quadrant need to be given special attention; they were important yet yielded lower satisfactory ratings by the respondents. This factor included variables such as high-speed Internet access, universal battery charger, and guest-device connectivity. Gap analysis showed that this factor is significantly more important to business travelers than leisure travelers (See Table 2). This finding has two implications: a) even though there is a significant difference score between business and leisure travelers, these amenities are still important to both travelers; b) hoteliers should do a better job in offering better business entertainment amenities in guest rooms. According to Cobanoglu (2010, p. 1), "guests want reliable HSIA connectivity in guest rooms regardless of whether they pay or not, and offering complimentary HSIA does not give hoteliers a pass to do a poor job." Poor Internet service may impact overall satisfaction of the hotel guests, causing them not to return to the hotel and brand.

Quadrant IV: Low Priority

Quadrant IV (low priority) includes in-room entertainment technology amenities that are both low in importance and satisfaction, thus of low priority for hoteliers. In the current research, Pure entertainment factor was placed in this quadrant for both business and leisure travelers. The amenities found in this factor were Promotional video, Game Console #1, Game Console #3, Game Console #2, Internet on TV and Music. However, just because a factor appeared in the "Low Priority" quadrant, may not mean that hoteliers should ignore them. This finding may be because: a) these amenities may be in the first stage of their technology life cycle and therefore may move into a mainstream stage later; or b) the value of these are not known or expected by current hotel guests. The novelty theory suggests that some hotel guests will look at technology out of curiosity (Hirschman, 1980). The amenities in this factor may be ones that hotel guests will seek out of curiosity. Even though these entertainment technology amenities may not be mainstream currently, they may be offered to the curious guests on a "on-demand" basis.

CONCLUSIONS AND RECOMMENDATIONS

The study makes three significant contributions to the tourism literature. First, the study fills an important gap in the literature by providing researchers, hoteliers, and hotel manager with a comparison of the perceived satisfaction and importance of technology amenities in the guestroom. The use of Importance-Performance Analysis (IPA) has significant potential in helping industry decision-makers see how business and leisure travelers value in-room entertainment technologies in the guestroom. Secondly, this study also fills an important gap in the literature because it focuses specifically on in-room entertainment-technology amenities, whereas other research has focused primarily on hotel-operational technologies. Managers and operators would do well to review the importance and satisfaction means and their implications presented in this study. Special focus on in-room entertainment technology amenities would serve well for short- and mid-term strategies. Additionally, marketing managers might develop marketing strategies that promote the amenities that were identified in the "Low Priority" quadrant of the IPA grid.

Currently, hotels, especially the luxury market, are competing to provide the latest technologies for their customers (Collins & Cobanoglu, 2008). However, our findings show that many of these investments do not seem to be appreciated by a significant proportion of guests. The

Importance/Satisfaction Matrix presented in the current study showed that many of the in-room entertainment technology amenities are currently a low priority for guests. This study identified the in-room entertainment-technology amenities that hotels should keep offering along with those that are currently salient for leisure and business travelers.

Thirdly, this study identified that there were no differences between leisure and business travelers in the importance of in-room entertainment amenities. Earlier studies (Cobanoglu, 2001) showed that there was a distinction between business and leisure travelers. One may speculate that this is due to the fact that technology is having a greater influence and adoption by a wider swath of the population and is no longer limited to business applications. Similarly, there were no significant differences in satisfaction scores between leisure and business travelers. Additionally, as guests increase their use of technology, the importance of in-room entertainment amenities should continue to increase. Today, HSIA has become a standard amenity in hotels. Thus the level of importance and satisfaction were very high.

This study also contributes to the knowledge base that is relevant to hotel operators in four significant ways. First, the current study found that a majority of respondents carry their laptop while traveling. Audio players such as MP3s were the second most popular gadget carried while traveling. Thus, hotels also should focus on guest device connectivity tools that allow guests to connect their laptops to TVs or listen to music with speakers in the guestroom. Moreover, the current study found that a predominance of respondents reported spending more than 3 hours in their hotel room, not including time spent sleeping. Roughly half of the respondents spent 3-5 hours in the guestroom. There appears to be a big opportunity for hoteliers to connect with customers through in-room entertainment technology amenities. With guests spending more time in guest rooms, hotels have the potential to generate revenue by providing in-room entertainment options that guests value but are not widely available in the consumer market. For example, only 10% of respondents take their portable gaming devices while traveling. Therefore, hoteliers may consider installing TV systems equipped with games or providing gaming consoles for the guests.

Second, in this current study the level of importance of only two of the in-room entertainment technologies was found to be significantly different between leisure and business travelers. These were HSIA in the guestroom and guest-device connectivity, both of which were perceived

to be more important by business travelers. Business travelers demand Internet connection all the time; moreover, they want to connect their own devices to the guestroom television. Television and HSIA are the two most important guestroom technology attributes influencing hotel selection. And according to AH&LA, almost all of the hotels are providing HSIA. Our study showed that respondents have high satisfaction with HSIA, so hotels should keep up the good work. Moreover, respondents perceived promotional TV as the least important technology amenity in the guestroom. Consequently, new opening hotels should consider this fact prior to offering that amenity.

Third, our survey results identified the amenities that were of low importance but for which respondents reported high satisfaction. These results indicate the amenities that are not very important to respondents. Video on Demand and High Def TV were the two amenities that respondents agreed were not very important when they select a hotel; however, they were highly satisfied with them. However, to be compatible with the government's switch to all HD signals in 2009, the number of hotels that offer HDTV sets in guestrooms increased considerably, from 10% to 36% in 2006 (AH&LA, 2008).

Finally, the current findings identified amenities that were both low in importance and satisfaction, and thus low in priority. These included promotional video, gaming consoles, Internet on TV and In Room Fitness amenities. There were also amenities important to travelers that provided low satisfaction. These included Music, Universal Battery Charger, and In-Room Desktop PC. These amenities likely need special attention as they were relatively more important and less satisfactory for the respondents. Hotels should focus additional effort to this area. Furthermore, the survey pointed out amenities that are important to travelers and on which their satisfaction is relatively high. Free-To-Guest (FTG) TV, Guest-Device Connectivity and HSIA(High-Speed Internet Access) were the only guestroom technology attributes that had relatively high importance and high satisfaction; consequently, hotels should keep up the good work.

Based on the findings of this study, two recommendations are offered for consideration to hoteliers and hotel managers. First, hotels should consider installing guest-device connectivity tools so that guests can connect their laptops to TVs or listen to music with speaker in the guestroom. Secondly, there is an opportunity for hoteliers to magnet the customers with guestroom amenities since guests tend to spend vast amount of time in the guestroom. Managers and operators would also do

well to analyze the four quadrants of Importance-Performance Analysis grid. Amenities in each quadrant may be an indication of the need for deploying different strategies depending upon the hotel's customer habits and market position.

Future Research

Since the technology items change significantly over time, this study should be replicated at least every 2 years. Additionally, future studies should look at the location of the hotel and the importance of in-room entertainment-technology amenities to their guests. Future research also should be conducted to replicate the current study in international markets, such as Canada, Europe, or Asia, to gain a better understanding of differences in in-room entertainment expectations that may exist between U.S. and international travelers. Future research should investigate actual usage patterns of in-room entertainment-technology amenities of travelers along with a focus on cost-profit analysis of in-room entertainment- technology amenities implemented in hotels. Finally, research should address the ease of in-room technology amenities. Each of these streams of research could provide useful information that aids hotels in making investment decisions for in-room entertainment amenities.

References

Amdekar, J. (2006). *The connected hospitality enterprise*. Infosys. Retrieved from http://www.infosys.com/industries/hospitality-leisure/white-papers/connected-hospitality-perspective.pdf

American Hotel and Lodging Association (AHLA). (2008). *2008 Lodging Survey*. Washington. DC: Author.

Ananth, M., DeMicco, F. J., Howey, R.H., & Moreo, P. J. (1992). Marketplace needs of mature travelers in the American lodging industry. *The Cornell Hotel and Restaurant Administration Quarterly, 33*(4), 12-24.

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

Boukis, J. P. (2007). In-room expectations rise. *Hotel F&B*, 32.

Chang, H., & Yang, C. (2008). Do airline self-service check-in kiosks meet the needs of passengers? *Tourism Management*, *29*(5), 980-993. doi: 10.1016/j.tourman.2007.12.002.

Cobanoglu, C. (2010.). *The fate of HSIA in hotels*. Retrieved from http://www.htmagazine.com/ME2/dirmod.asp?sid=783D4AA2541D483C98659D20A3539C6E&nm=Additional&type=MultiPublishing&mod=PublishingTitles&mid=3E19674330734FF1BBDA3D67B50C82F1&tier=4&id=D32458F37E48410F9831E086F168A4D6

Cobanoglu, C., Ryan, B., & Beck, J. (1999). *The impact of technology in lodging properties*. Richmond, VA: International Council on Hotel, Restaurant, and Institutional Education Annual Convention Proceedings.

Deeb, W. E., & Murray, I. (2002). *Hotel guests and their expectations for technology in the guest room*. ASAC .

Deng, W. (2007). Using a revised importance-performance analysis approach: The case of Taiwanese hot springs tourism. *Tourism Management*, *28*(5), 1274-1284. doi: 10.1016/j.tourman.2006.07.010.

Frauman, E., & Banks, S. (2010). Gateway community resident perceptions of tourism development: Incorporating Importance-Performance Analysis into a Limits of Acceptable Change framework. *Tourism Management*, *In Press, Corrected Proof*. doi: 10.1016/j.tourman.2010.01.013.

Ham, S., Kim, W. G., & Jeong, S. (2005). Effect of information technology on performance in upscale hotels. *Information Technology in Hospitality, 4,* 1, 15-22.

Hansen, E., & Bush, R. J. (1999). Understanding customer quality requirements: Model and application. *Industrial Marketing Management, 28*(2), 119–130.

Hansen, E.L., & Owen, R.M. (n.d.). Evolving technologies to drive competitive advantages / Arthur Andersen. Retrieved from http://www.hotel-online.com/Trends/Andersen/tech.html

Hirschman, E. (1980). Innovativeness, novelty seeking, and consumer creativity. *Journal of Consumer Research, 7,* 287.

Hotel Technology Next Generation. (2002). In-room technology workgroup. Retrieved from http://www.htng.org/workgroups/irt.htm

Howell, R. A., Moreo, P. J., & DeMicco, F. J. (1993). A qualitative analysis of hotel services desired by female business travelers. *Journal of Travel and Tourism Marketing, 1*(4), 115-133.

Inge, J. (2006). The electronic guestroom. *Hospitality Upgrade* , 8-22.

Kotler, P., Bowen, J.T.,& Maken, J.C. (2003). *Marketing for hospitality and tourism* (3rd ed.). New York: Prentice Hall.

Martilla, J. A., & James, J. C. (1977). Importance-performance analysis. *Journal of Marketing, 41* (1) 77-79.

McMullen, S. (2006). Guests demand latest, greatest in-room entertainment. *Hotel & Motel Management, 221*(5) 36.

Meade, P.T., & Rabelo, L. (2004). The technology adoption life cycle attractor: Understanding the dynamics of high-tech markets. *Technological Forecasting and Social Change, 71*(7), 667-684.

Mollman, S. (2007, June 5). *In-room entertainment: What offerings, at what price?* Retrieved from http://edition.cnn.com/2007/BUSINESS/06/05/hotels.entertainment/

Moore, G. A. (1991). *Crossing the chasm: Marketing and selling high-tech goods to mainstream customers*. New York: Harper Business.

Mossberg, W. (2005, June 30). Device lets you watch shows on a home TV, TiVo from elsewhere. *The Wall Street Journal.*

Norman, D. A. (1998). *The invisible computer: Why good products can fail, the personal computer is so complex, and information appliances are the solution.* Cambridge, MA: MIT Press.

Olsen, M. D., & Connolly, D. J. (1999). Antecedents of technological change in the hospitality industry. *Tourism Analysis, 4*, 29-46.

Olsen, M. D., Connolly, D. J., & Allegro, S. M. (2000). *The hospitality industry and digital economy*. Lausanne: International Hotel and Restaurant Association.

Parasuraman, A., & Colby, L. C. (2001). *Techno-ready marketing: How and why your customers adopt technology.* New York: Free Press.

Price, N. (n.d). *Industry leaders will work together on next generation guestroom technology*. www.htng.org/HTNG_Release_092304.htm

Rock, J. (2008). Connectivity panels allowing guest to interact with in-room technology. *Hospitality Upgrade.*

Rock, J. (2008). *New wireless technologies are changing the way guests interact with room technology. Hospitality Upgrade.*

Rogers, M. (1995). *Diffusion of innovations* (4th ed.) New York: Free Press.

Sammons, G., Moreo, P.J., Benson, L., & DeMicco, F. J. (1999). Marketplace needs of female business travelers. *Journal of Travel and Tourism Marketing, 8*, 1.

Singh, A.J., & Kasavana, M.L. (2005). The impact of information technology on future management of lodging operations: A Delphi study to predict key technological events in 2007 and 2027. *Tourism & Hospitality Research 6,* (1) 24-37.

Siguaw, J. A., Enz, C. A., & Namasivay, K. (2000). Adoption of information technology in U.S. hotels: Strategically driven objectives. *Journal of Travel Research* , 192-200.

Shifflet, D. K. (1992). Bringing in the business travelers. *Hotel & Resort Industry, 15,* (11), 66-72.

SPSS (2009). *Statistical Package for Social Sciences.*

Stoller, G. (2010, February 8). [Hotels' new-tech TVs have guests fuming]. *USA Today*. Retrieved from http://www.usatoday.com/travel/hotels/2010-02-09-businesstravel09_ST_N.htm

Qu, H., & Tsang, N. (1998). Service quality gap in China's hotel industry : A study of tourist perceptions and expectations. *Journal of Hospitality and Tourism Research, 22* (3), 252-267.

Tatikonda, M.V., & Rosenthal, S.R. (2000). Technology Novelty, Project Complexity, and Product Development Project Execution Success: A Deeper Look at Task Uncertainty in Product. *IEEE Transactions on Engineering Management, 47* (1).

Taylor, J. (1999). DVD-Video: multimedia for the masses. *Multimedia, IEEE, 6* (3), 86-92.

Tonge, J., & Moore, S. A. (2007). Importance-satisfaction analysis for marine-park hinterlands: A Western Australian case study. *Tourism Management, 28*(3), 768-776. doi: 10.1016/j.tourman.2006.05.007.

Van Hoof, H.B., Hubert, B. C., Collins, R., Combrink, E. T., & Verbeeten, J.M. (1995). Technology needs and perceptions: An assessment of the US lodging industry. *Cornell Hotel and Restaurant Quarterly, 36*(5), 64–70.

Van Hoof, H.B., Verbeeten, M.J., & Combrink, T.E., (1996). Information technology revisited—International lodging—Industry technology needs and perceptions: A comparative study. *Cornell Hotel and Restaurant Administration Quarterly, 37* (6) 86–91.

Van Hoof, H.B., Hubert, B. C., Collins, R., Combrink, E. T., & Verbeeten, J.M. (1995). Technology needs and perceptions: An assessment of the US lodging industry. *Cornell Hotel and Restaurant Quarterly, 36*(5), 64–70.

Zhang, H. Q., & Chow, I. (2004). Application of importance-performance model in tour guides' performance: evidence from mainland Chinese outbound visitors in Hong Kong. *Tourism Management*, *25*(1), 81-91. doi: 10.1016/S0261-5177(03)00064-5.

Anil Bilgihan is a Ph.D. Student, Rosen College of Hospitality Management, University of Central Florida; **Cihan Cobanoglu** is Associate Professor, University of South Florida Sarasota-Manatee; **Brian L. Miller** is Associate Professor, University of Delaware.