Key issues for ICT applications: impacts and implications for hospitality operations

Robin B. DiPietro

*School of Hotel, Restaurant and Tourism Management,
University of South Carolina, Columbia, South Carolina, USA, and*

Youcheng (Raymond) Wang

*Rosen College of Hospitality Management, University of Central Florida,
Orlando, Florida, USA*

Abstract

Purpose – The purpose of this paper is to understand several key issues regarding technology strategies for the lodging industry, including the use and impact of technology, technology adoption and implementation, the role of organization technology environment in technology use, channel management strategies, as well as future trends of technology development.

Design/methodology/approach – Qualitative interviews are conducted with hotel practitioners to gain knowledge in order to help explore issues and generate hypotheses for future research regarding information and communications technology (ICT) applications in the lodging industry.

Findings – The research finds that technology will continue to impact guest service and customer relationship management in the lodging industry, and that companies vary in their implementation and use of the technology applications.

Research limitations/implications – Using qualitative research limited the number of hotels that could be interviewed; as a result, the findings cannot be generalized to every hotel.

Practical implications – Hotel owners and managers can look at the various trends and determine which can help their guest service, focusing on providing added value to guests.

Originality/value – The paper provides insight from the viewpoints of practitioners rather than just from technology experts.

Keywords Communication technologies, Hospitality services

Paper type Research paper

Introduction

Technology, particularly information and communication technology (ICT), is becoming an important strategic asset for hospitality organizations to improve their organizational performance and strategic competitiveness (Cho and Olsen, 1998; Nyheim *et al.*, 2004). As a result, there is a growing significance of the role of technology in enhancing a hospitality organization's competitive advantage, and thus contributing to the success of the organization (Wang and Qualls, 2007). As a matter of fact, ICT use in the hospitality industry has been changing at a speed faster than at any other time in history. As the younger generations become more adept at the use of technology, they want to bring that into their lodging and dining experiences. The decision to adopt and use new technology or technology systems has become so important that many hospitality organizations are transforming their corporate or organization structure to include functions and positions such as creating a technology

department, a technology concierge, or a chief information/technology officer to oversee technology-related decisions (Nyheim *et al.*, 2004; Wang and Qualls, 2007).

The issue of ICT is important for a variety of reasons. One of these reasons is that it is often more efficient to use technology to transmit information, facilitate communication and enable transaction and customer relationship management (Siguaw *et al.*, 2000). The new generations of guests, both internal and external, have an expectation of using more technology in their business interactions. Just as it has become commonplace to have a television in a hotel room, it is starting to become more commonplace to have access to wireless and wired internet connections in hotel rooms now, along with other technological applications.

Some of the technology that has been implemented in the hospitality industry has been the use of organizational websites, the use of electronic reservation systems, travel websites to plan and book trips with, wireless internet available in more locations, self check in and check out systems, software programs for scheduling, costing and budgeting. These uses of technology have not necessarily eliminated jobs, but have helped to make jobs more flexible and possibly more meaningful to employees (Tesone, 2006). However, as argued by Sigala (2003), technology use will not generate the maximum results when organizations only focus on the functions of single pieces of technology without looking into the synergistic and integrative capability of technology clusters. In this sense, ICT decision making should be treated as part of the organization's overall strategic decision making.

With this backdrop, several issues appear to be important for hospitality organizations in general, and lodging organizations specifically, to make the best decision in relation to ICT, such as the impact of technology, technology adoption strategies, as well as how technology is used in the lodging industry currently and how it is expected to change over the course of the next few years. This study intends to answer these key questions. In particular, the study objectives are to:

- assess the use and impact of ICT on lodging organization's performance;
- examine issues related to the process of ICT adoption and implementation;
- evaluate lodging organization's technology environment in supporting and facilitating the use of ICT;
- examine how lodging organizations use ICT as a distribution channel and how they manage the effectiveness of these channels; and
- assess the technology trends/changes in the foreseeable future and understand how lodging organizations respond to the changes.

Review of literature
Technology use and impact in the lodging industry
Historically, the lodging industry has distributed information through print-based media such as brochures, travel planners, or regional guides, and received reservations by mail, phone, and fax. More recently, hotel rooms have been made accessible for booking through global distribution systems (GDS) and through direct access to hotels using central reservation systems (CRS). However, such technologies have been inadequate as customers have traditionally not had access to these systems and travel intermediaries have experienced difficulty and delay in finding and booking appropriate hotels, whereas hotels have experienced high administrative costs

attracting and processing bookings from customers. The emergence of new ICTs presents new opportunities to make these processes more accessible and more efficient (Buhalis, 2003).

Indeed, the use of the ICT in the lodging industry is growing exponentially and this enables hotels to reconsider the way they are doing business (Wang and Qualls, 2007). Although the lodging sector overall has been slow to use ICT as compared to other industry sectors (Nyheim *et al.*, 2004), many hotel managers are becoming increasingly aware of the potential distribution, promotion, and interactive marketing advantages of technology. ICT offers several advantages for hotels of all sizes. One of the advantages is increased effectiveness due to cost reduction and revenue growth. Another advantage is higher quality customer relationships due to the possibility of personal contact services and dialogue with the customer (Wang, 2008a). For example, customers can answer questions about their personal preferences for rooms, and based on this information, a customer receives services at the hotel that are adapted to his/her preferences. In the *Lodging Industry Technology Study* (2004) which is co-sponsored by the *Hospitality Information Technology Association and Hospitality Technology Magazine*, they identified the top five primary reasons for implementing technology in the lodging industry as: productivity improvement, enhanced guest services, revenue generation opportunities, cost reduction and savings, and competitive pressures.

Even more than just providing the opportunity for marketing using online distribution channels, hotel organizations have to look within the hotel in order to determine if they are meeting the needs of their traveling guests. More guests want the comforts of home in their hotel room, which means wireless internet access, larger and more advanced televisions, the capabilities of interfacing on a variety of levels with technology that used to be just used in the home. According to Gebhard Rainer, VP of Finance and Strategy at Hyatt International, they have experienced a major shift in expectations regarding technology. Guests want to have the same access to technology that they have at home and technology must be a service enabler or an efficiency accelerator (Paul, 2005). Trying to maintain this positive guest service focus, the Hilton also focuses on guest expectations regarding technology in order to improve the guest experience (Hoover, 2008).

Technology adoption and implementation
In the effort to understand technology adoption and implementation, the technology acceptance model (TAM) by Davis (1989) is probably the most extensively used to explain and predict consumers' and/or organizations' willingness to adopt new technologies (Wang and Qualls, 2007). Several other models built on Davis' work have been proposed to guide inquiry into this phenomenon (Cheong and Park, 2005; Davis *et al.*, 1989; Venkatesh *et al.*, 2003). These studies on technology adoption have provided the theoretical basis for a viable behavioral framework of technology adoption by integrating concepts and findings from the studies of innovation adoption. The central theoretical premise underlying TAM is that an individual's intention to purchase a product or service is determined by two factors: perceived usefulness and ease of use of the product or service.

A common theme underlying these models is the inclusion of perceptions of an innovation as key independent variables influencing adoption behavior (Agarwal and Prased, 1998; Wang and Qualls, 2007). All of these models are built on the principles of

the theory of reasoned action (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975) which postulates that perceptions or beliefs about the innovation itself are instrumental in the development of attitudes that eventually result in the system being utilized. Although originally proposed to understand the adoption of computer-based technologies, the completeness of this theory suggests that it is equally applicable to the adoption of any technology.

Organization technology environment
Lodging companies are motivated to adopt technology in an attempt to achieve a competitive advantage (Cho and Olsen, 1998; Nyheim *et al.*, 2004). However, in the effort of achieving a competitive advantage through technology, lodging companies usually face different technology environments because of the different foundations of technology understanding and expertise, resources, or support from management. These factors will affect the technology adoption process as well as how the technology will be used.

Wang and Qualls (2007) define "organization technology environment" as the lodging companies' degree of technocratization and environment in facilitating, supporting, and implementing any technology-related projects. This can be measured by multiple constructs from multiple dimensions such as the level of technology knowledge and expertise, management support of and involvement in technology projects, and the technology budget. It is believed that a lodging company with a higher degree of technological knowledge and skills embedded in its employees and managers may reduce their resistance to technology use. They might be more receptive to technological change, and be more willing to adapt and integrate the technology into their daily business operations (Wang and Qualls, 2007). Previous research has shown that organizations with higher level of technology knowledge and expertise develop unique cultures around their ability to accept new technology and change. These organizations are more willing to deviate from existing practices in creating new products and/or processes through the use of new technologies (Srinivasan *et al.*, 2002).

Research has also shown that technology projects are usually constrained by resources available to the organization, especially the budget to support the adoption. Previous research has demonstrated that the technology budget has a great impact on whether organizations can eventually adopt and use the technology, irrespective of how beneficial the technology might be to the organization (Wang, 2008b). It, thus, has a positive effect on the overall adoption behavior (Ariss *et al.*, 2000; Goode and Stevens, 2000). This proposition has been widely supported by other researchers who argue that having adequate resources is a necessary first step toward the decision to adopt information systems as well as the extent of usage (Thong, 1999; Zhu and Kraemer, 2005). Earlier studies have suggested that businesses that budget for information technology acquisition and maintenance are likely to be technology adopters and constant users (Goode and Stevens, 2000). It is easy to conceive that implementing e-business functions within an organization requires investment to obtain hardware, software, system integration and employee training (Zhu and Kraemer, 2005; Wang and Qualls, 2007). Sufficient resources dedicated to e-business allow the organization to obtain the necessary resources and develop them into superior e-business functionalities (Zhu and Kraemer, 2005).

Channel management
The hotel industry has experienced several challenges since the introduction of electronic distribution channel systems. One of the major challenges is the entrance of online wholesalers, such as Expedia.com or Hotels.com, into the market. While the increase in online bookings through these intermediaries helps hotels sell their distressed inventories that could otherwise go unsold, the profits enjoyed by those channels represent a leakage of potential profits that could be reclaimed by the hotel industry (Carvell and Quan, 2008). Indeed, online wholesalers with power to negotiate lower prices for rooms as well as with sophisticated marketing strategies have been able to go directly to the consumers with deep discounted room rates, which have proved to be a threat to hotels' pricing and brand integrity.

In response to such challenges, hotels also introduced web-only lowest prices to encourage customers to book directly from their own websites instead of booking through other online distribution channels. Some hotels even collaborate to create consolidated online channels to distribute their inventory directly to customers and other travel websites, and to compete with online wholesalers in order to control their own prices. This is because online wholesalers consider themselves as "complementary" channels that help hotels fill the empty rooms and bring exposure to the public, hotels view such distribution channels as competitors (rather than partners) that may erode brand equity and control their pricing decisions. In this process, channel conflict management becomes a key issue for hotel companies to prioritize their resources and maximize their revenues.

Technology trends
Using a Delphi study with professors in hospitality, Singh and Kasavana (2005) explored the future use of technology in the lodging industry. The study determined that reliance on a wireless technology will increase efficiencies and effectiveness and will allow more freedom to the lodging personnel to work on customer relationship management instead of dealing with as much of the paperwork and little things that technology can replace. The study asked experts which technological applications would have the most impact in 2007 and 2027. The results found that wireless networks would be prevalent and that Bluetooth technology would be helpful in the meetings side of lodging. It was also anticipated that radio frequency identification devices would be used to help with inventory control, as well as transaction and performance monitoring in the industry. They predicted that online reservation channels would be the primary source of reservations moving into the future, and that complex distribution channeling would be made easier through the use of technology (Singh and Kasavana, 2005).

Echoing these sentiments is Tim Harvey, the Chief Information Officer at Hilton Hotels who says that people are spending more disposable income on leisure trips and businesses are spending more on business trips, and what used to be a novelty (digital television, digital recorders, and portable media devices) will soon become a minimum requirement for lodging properties to have in the guest rooms (Paul, 2005). Many of the hospitality executives' opinions brought up in Paul's (2005) article emphasize the importance of keeping up with technology and guest demands or lose out to the competitor that is meeting guest technology needs. It is important to remember that what was once just a novelty is becoming a necessity for the traveler to have access to.

Methodology

Research procedure

This study intends to understand several key issues regarding technology strategies for the lodging industry, including the use and impact of technology, technology adoption and implementation, the role of organization technology environment in technology use, channel management strategies, as well as future trends of technology development. Owing to the exploratory nature of the study, a qualitative method was deemed most appropriate. Marshall and Rossman (1999) indicated the purpose of a qualitative study is to investigate little understood phenomena, to identify/discover important variables, and/or to generate hypotheses for further research.

Different from previous studies typically using academics' insights and perceptions in answering a similar set of questions, this study utilizes interviews with industry practitioners as a tool to answer the above questions. The practitioners selected for this study are not only the daily users of the technology applications in their lodging organizations, but also the decision makers regarding technology strategies for their organizations. It is believed that these practitioners are in the best position to provide thoughtful insights by integrating their technology experience with the questions raised regarding technology use in their lodging property.

In order to achieve this goal, an interview protocol was developed to facilitate the interview process. The interview protocol used open-ended questions covering the major research objectives of the study. Under each major area, specific questions were developed to solicit the industry practitioners' perceptions about technology applications in their respective organizations. Specifically, five questions were developed for use and impact of technology, five for technology adoption and implementation, six for organization technology environment, three for distribution channel management, and another six for technology trends (see Appendix for a complete list of questions used).

During the month of September, 2008, three lodging properties were investigated regarding their technology strategies: the Hilton Omaha (Nebraska) is a city owned, corporately managed property; the Cornhusker, a Marriott Hotel, is a franchised operation located in Lincoln, Nebraska; and the Gaylord Palms in Orlando, Florida is a corporately owned and managed property. While analyzing the three properties, four top executives were interviewed regarding their use of technology and the changes that they had seen in the lodging industry over the past five to ten years and what they anticipate will be changes to come in the future. The practitioners that were interviewed are experts in the field of lodging and technology and have provided some insights into what their companies are doing to move forward in their use of technology to help their guests. The interviews with these executives were first recorded and then transcribed for data analysis.

Profiles of interviewees and hotels

The first hotel practitioner that was interviewed was Bert Gonzales, information technology manager for the Hilton Omaha which is a four diamond property located in Omaha, Nebraska. The Hilton Hotel – Omaha, Nebraska is a franchised property that is owned by the city of Omaha and managed by Hilton Corporation. The market is primarily a business market with some leisure travelers as well. They are the only four diamond hotel in Nebraska and they have 450 guest rooms. They offer a wide array of

non-room amenities such as convention space, pool and fitness center, restaurant, and lounge area, as well as snack shop and valet parking.

The second hotel was The Cornhusker, a Marriott Hotel, which is a franchised property that is owned and managed by Shube Hotel, LLC. Interviewed there were General Manager Kent Peterson and Ryan Nash, the Director of Event Technology, Hotel Services Division (with presentation services audio visual (PSAV) – a contracted audio visual company). The Cornhusker is operated by Island Hospitality and is located in Lincoln, Nebraska. The market is primarily a leisure market with most of their business travelers coming in Sunday-Thursday and then the transient guests coming in on the weekend. The other primary segments are business group and leisure groups and they come during both the weekdays and weekends. The hotel has 297 guest rooms with a restaurant and lounge, gift shop, pool, business center, exercise room, concierge lounge, and valet parking. They manage the gift shop and purchase Starbucks products to sell through the gift shop.

The last hotel technology practitioner that was interviewed was Richard Zarth, the Chief Information Officer at Gaylord Palms Hotel, Orlando/Kissimmee, Florida. The Gaylord Palms Hotel is located in the Orlando/Kissimmee, Florida area within a few miles of Disney property. The hotel is corporately owned and operated by Gaylord Enterprises. There are 1,406 rooms in the property and about 80 percent of their business is group and about 20 percent of their business is leisure travelers. Many of their guests mix business and pleasure together to ensure that the guest can make the most of their trip to the Central Florida area. Some of their amenities include outdoor pool areas, multiple restaurants and lounges, a large central atrium with a glass ceiling, gift shop, pool, business center, exercise room, concierge, the Canyon Ranch spa, and valet parking.

Research results
Impact of technology use
The industry experts were asked about the impact that technology has had on their property and on the lodging industry in general. From the interviews, it is clear that technology has an impact on operations, customer service and marketing in the lodging properties. In the operations area, there are software programs that can help with routing and processing work orders that impact the guest satisfaction. According to Gonzalez at the Hilton:

> [...] Site Energy is a software program that allows for routing and processing work orders. This ensures that needs of the guest and hotel are taken care of more efficiently through the use of technology. As soon as a problem is called in by a guest or employee, it is entered into a computer system. When the problem (whether a burned out light bulb or a lack of towels in a room) is solved, the person that takes care of the problem notes its accomplishment through the computer-based system and it is checked off as completed on the computer. The technology can provide statistics for the hotel on where issues have been occurring, and another component of the system can help profitability.

Peterson and Zarth both echoed this response by stating that technology allows the hotel to know what the guests want, when, and this allows them to better serve the guests.

The Gaylord Palms uses a software system that helps with operations and guest service that is called I-Connect. It is administered through a personal computer-housed

in each guest room that is accessible to all guests staying in the hotel; it has a portal with in-house applications. It gives the guest an in-house directory and an online directory regarding everything that is happening in the hotel and throughout the area. The guest can find out what the various outlets in the hotel are, they can look at menus, and they can even find out about the things to do around town. There is a way to find directions from your room in the hotel to meeting rooms. There is also a way to order room service, order more towels and pillows, or whatever the guest may desire. This system saves paper since everything can now be done online rather than through paper copies and a paper trail. This helps the hotel be more "green" in its practices.

Two of the three hotels stated that they use the technology to help them track and monitor guest service issues. "Technology will never replace the personal customer service that guests want sometimes, but it can help supplement the personal service" states Gonzalez at the Hilton. The Gaylord Palms also monitors guest service through their I-Connect system.

Marketing is greatly impacted by technology and for the Hilton technology is used to:

[...] help to crunch numbers regarding room rates and occupancy that used to be done by hand. It also provides the help when dealing with the various distribution channels and opaque channels such as priceline.com. The marketing channels also give us information on how we compare with other Hilton units and hotels that are in our competitive set.

When asked about who benefits by implementing technology in the lodging properties, all interviewees stated that everyone in the hotel benefits since it saves costs, energy, and time for both employees and guests. All of the stakeholders in the company benefit as it makes the jobs more efficient and gives the guests what they want when they want it. Overall, the technology that is implemented in these hotels helps employees provide better guest service, makes the employees' jobs easier, and creates a friendlier environment since employees are not as caught up in busy work, but can devote more time to the guests.

Peterson at The Cornhusker, A Marriott Hotel states that all departments benefit from technology as:

[...] sales staff are finding leads and researching companies through the internet. They are using (the software package) Guest Track to find out guest satisfaction (levels) and guest preferences and profiles by using technology. With human resources, it helps out in doing payroll, background checks on associates, drug testing, internal training and promotions. There is a Marriott intranet that delivers training to the associates that they can use to get some additional training to get promoted.

Technology adoption and implementation
When the hotel representatives were asked about what influenced the successful implementation of technology into the property, the smaller properties (Hilton Omaha and The Cornhusker, A Marriott Hotel) stated that the transition process in the hotel was important. The most important factors are "making it easy for users [...] showing them the benefits to the new technology" according to Gonzalez. It is a little more difficult to adopt new technology in a larger property such as the Gaylord Palms. Zarth states that it is important to look at everything when adopting new technology in the hotel.

It has to be the right technology. The strength of the vendor is very important, for example the vendor has to have experience in the installation of technology into this

size of property. This is a big property and we have to use experienced vendors, so it limits the vendors we can use. There are 400,000 square feet of convention space here. We also have a pretty good technology staff because we sell technology – we are at \$2.1 million in revenue this year (through September, 2008). The ability to sell and service the technology that we use is critical. We are a revenue generating department in this hotel. We are building networks for the convention side – we sell it, deliver it and service it. We also take care of everything from the room side of things as well.

When lodging properties, no matter how they are owned or managed, think about adopting new technology, one of the biggest constraints is the cost of the technology. Another constraint is that the technology is consistently changing and it is hard to know when to purchase the technology so that it is not outdated once it is installed. Zarth at Gaylord Palms states that:

> Cost is definitely a factor and longevity of the technology – once you spend a lot of money, you have to ensure that the technology will be current. There are risks and rewards to being the first mover on using the new technology and there is an ROI perspective of the updated technology. The stakeholders definitely want to see that you are going to provide a return on investment for the technology purchased.

This echoes the importance of balancing the cost of the technology with the cost of not implementing the technology. A final constraint regarding the implementation of new technology is the ability to show the stakeholders in the organization the benefits of the technology. Often, different hotel brands use varying levels of technology and it makes it a difficult sell to corporate headquarters to be the brand on the cutting edge with technology.

In the selection method of technology to be used, this varies between the hotels based on ownership and management models. The corporate technology team at Hilton Corporation chooses the brand of technology used in hotels. For the franchised The Cornhusker, A Marriott Hotel, the Marriott Corporation makes recommendations, but it is ultimately up to the franchisee in most cases regarding which technology is implemented in the hotel. Marriott has certain technology requirements, but other than those few things, they leave the rest up to the franchisee to decide. With the Gaylord Palms and the size of their technology needs, because they are a corporately owned and managed property, they make purchasing decisions for technology by using a request for proposals request for proposals (RFP) process. Zarth says that:

> When it's time to replace a system or if a software vendor gets a lot of complaints, then we develop an RFP and we send it out to request that companies send us information on what they can do for us. Once the RFPs come back, we evaluate them and determine which vendor to use. We spend a lot of time with the vendor when we do change. We reevaluate the scenarios to see if there are changes that we would like to make. We don't use knee jerk reactions when changing technology; it is a well thought out process using the RFPs.

Gaylord Palms has their executive committee making decisions about the technology strategy, where the other hotels defer to the corporations to make the strategic decisions about technology.

Organization technology environment
When the technology experts were asked about their management team and employees' comfort level with technology, all of them discussed the training that they

www.man

have when new technology is implemented. The Hilton Corporation has webinars to help the technology adoption process, and the Hilton Omaha has training set up on site to help with people's comfort level. Gonzalez stated that everyone was very supportive and excited about new technology. Gaylord Palms is very similar in that their staff is very supportive about new technology and they are all provided training in order to allow the technology to be a benefit in their jobs. Gaylord Palms also offers a lot of computer-based training that could be used for self-improvement of the employees. There is a cyber café that is available for the employees to use during their break time to improve their computer literacy.

Peterson at The Cornhusker, A Marriott Hotel finds that technology needs and support differ:

> Because of the various age groups that use our property and that work within our property, implementing technology is done using different time frames. The younger people are much quicker to ask for and implement technology. The older people sometimes rely on others to help them. The knowledge of the management and employees is a hit and miss – it depends on the education level of the individual. If there is good support and a degree of comfort from the person, then it goes much smoother. If not, there is a much slower adoption of new technology by both employees and managers. We have to ensure that the people that need the technology in their jobs have it. We are still in the people business.

Peterson believes that the company supports technology adoption, but he believes that there is a direct correlation between age and comfort level with the technology. He also believes that people are more open to systems that are easier to navigate. Because The Cornhusker, A Marriott Hotel is a franchised unit, they strive to obtain training as part of the purchase of technology, since they have budget constraints regarding providing the training on site.

Distribution channel management

Looking into the distribution channels that the hotels use for marketing and reservations, all of the hotels stated that they had to use all of the major online distribution channels, such as Expedia, Travelocity, and Priceline. Priceline is an opaque channel, which means that the customer bids a price, but they are not sure where they will get the hotel reservation at. All of the hotels also use their own company website to market and sell rooms. The reason that all of these distribution channels are used was summed up by Peterson who said:

> Our guests are using them and expecting us to be there too. We need everything so that we can have access to our guests. We have to have coordination between the different channels.

This sentiment was echoed by all of the hotels. It is in the hotel's best interest if the guest chooses the brand website to book their rooms as that way the hotel does not have to share the financial pie with the third party channel, but because of the guests' demands, hotels have to utilize all of the channels.

The future of technology when it comes to distribution channels is that increased technology will be used. Many hotel companies have implemented a computer program where guests can build their own events online. The potential for using this technology has been out for several years, but it is really taking off now as people are becoming more technologically savvy. Zarth of the Gaylord Palms believes that more of these

types of programs will be implemented in hotels as the guest continues to demand more from the technology and as the economy changes as well.

Technology trends
The last area of the interview asked the industry professionals their perceptions of the trends that have been happening in the realm of technology in the lodging industry over the past five years. The industry professionals stated that they keep up on industry trends by reading about the technology, living through the technological changes, as well as learning from their corporate headquarters about what other hotels are doing. Zarth at Gaylord Palms talks about the changes that are going to be coming in the near future in their hotel:

In guest rooms, you are going to have to have HD television, the I-Connect system will probably meld over into the television so that they can be quick and accurate with concierge – people will take on personal responsibility for things like wake up calls. Concierge services will be done through technology. Using reader boards in the lobby or throughout the hotels will help guests and management communicate. Technology will help to monitor communication with guests, wait times for outlets can be accessed, and communication through text messages or through mobile devices and using this updated technology to message to guests will all help the guest satisfaction and service. It will all revolve around the guest's mobile device. There are back of the house reader boards for the employees in order to communicate more efficiently.

Most of these changes have to do with making things easier for their technology savvy guests.

Some of the other changes that will be occurring in the near future have to do with technology utilized on the room keys. Gonzalez states that:

We are looking at new technology in keys for hotel rooms. We are testing the use of the internet in rooms for free, but as of right now, we still charge for the internet in the room.

He also stated that Hilton Corporation keeps many of their ideas for upgrades in technology to themselves until right before they are rolled out in order to keep the competition in the dark about the changes. Zarth at the Gaylord Palms also talks about the use of new technology for room keys:

Blue tooth or mobile devices for keys; maybe put the room key on the credit card. You have to be careful regarding personal information and security. Radio Frequency Identification Devices need to be looked at regarding the balance between security and convenience.

When asked about the need to keep up with technology, all of the hotel professionals stated that it was critical to keep up with the technology because their guests expect it. According to Zarth:

It is critical for lodging properties to keep up with technology because guests expect it now. There is no competitive advantage in providing just the basics of a bed and television, but providing guests with upgrades in technology could be the advantage that a property needs.

When asked about what has changed and what will change in the future, the industry experts stated that the biggest changes in the past five years have to do with the evolution of key cards and how that will continue to evolve over time, the check in and out process has become easier for guests and that will continue to evolve as check in and out kiosks will become more commonplace giving guests a choice on the

interaction that they have. Room technology has changed from just a television offered in the room to many more technological options. The future will also see more options for automated concierge services and airport information available at the front desk and online.

Gonzalez has stated that:

> The new technologies that seem to be coming forward in the lodging industry will have to do with safety and security in the property; they will also allow us to streamline things for the guest and allow for flexibility in options.

While Zarth agrees with this, he also states that a new area for hotels to be involved in is the social networks that people use now:

> The social networks (for example, facebook.com and myspace.com) are changing the way that we learn things and communicate with people and so that will change the way that hotels learn about their guests and guests learn about hotels. I have a lot of young people working in the information technology (IT) department, but throughout the hotel we have a great diversity in age. I think that there will be a business social network that creeps into the business organizations. People will want their personal social network and people want their business social network. Finding out how people want to be communicated with will change over time and with the different age groups in the workplace.

Discussion and implications
The industry practitioners' interviews brought up some interesting points which are summarized below. It seems that a wide variety of ICTs are used by the lodging industry such as company websites, electronic reservation systems, wireless internet access, self check-in and check-out systems, interface systems with third party distribution companies, as well as intranet systems for scheduling, budgeting, and internal communication. Some of the technologies are used to automate the business process in order to achieve efficiency and improve employee productivity, others are used to serve as major distribution channels for their products and services, still others are used to enhance the guests' overall experience and increase customer satisfaction.

It is clear from the industry interviews that the use of ICTs in the lodging industry has great impact on the business process. Even though different organizations place priorities in different areas, and the hotels had different ownership and management structures, the impact of ICTs is mainly reflected in three major areas: operations, marketing and communication, customer service and customer relationship management. This is consistent with Wang and Fesenmaier's (2006) work which argues that in order to assess the impact of technology, focus should be directed to the business values generated by the use of technology. These include, but are not limited to: reducing costs, process simplification, improving customer service, and generating new revenue.

In line with the above guidelines, the operational aspect of technology use assists hotels in several ways. First, technology can help hotel companies automate business processes, achieve business synergy, and ultimately increase efficiency and improve productivity. For example, the site energy software developed by the Hilton hotel interviewed allows for touting and processing work orders so that the needs of the guests are taken care of more efficiently through the use of this technology. Second, operation technologies help hotel companies have synergistic, seamless and effective

inter-departmental communication for better product development and service delivery. All of the three hotels interviewed emphasized the importance of technology use on communication improvement.

It is revealed from the interviews that ICT has great impact on hotel companies' marketing activities in terms of marketing information dissemination and communicating with consumers. The diversity of information in a hotel, especially in full service and resort hotels, and the increasingly discerning consumers mean that the quality and efficiency of information provision is becoming a differentiating factor for hotels. Many consumers demand specialized and in-depth presentation of the information to facilitate their decision making. In order to address their needs, proper levels of information need to be accessible to the right consumers in order to initiate and generate a purchasing interest (Wang and Qualls, 2007). The ubiquity, interactivity, comprehensiveness, and improved quality of the hotel marketing information provide the base for real-time communication, reliable service, and positive purchase experience which are important to customer satisfaction and ultimately retention of consumers.

The most highlighted impact of technology revealed from the interviews is probably in the area of customer service and customer relationship management. It is generally agreed upon that ICT can help hotel companies collect and analyze customer information and share the information across the company so that better services can be provided in order to make them happy and become repeat customers. Needless to say, this relationship building entails a dynamic exchange of communication with consumers at all levels. Buhalis (2003) expounds further on relationship building by focusing on the ICT used in the tourism industry. He notes that technology creates opportunities for one-to-one marketing that enables the management of customer relationships through establishing, maintaining, enhancing, and commercializing relationships. Through the use of new technologies, hotels should be able to know and understand their consumers' needs better, to target them individually with the right message at the most appropriate time. It seems that hotels are trying to learn about their guests' preferences so that they can provide customized interactions, particularly through the guests' wireless devices for example. As a result of these capabilities, hotels are better equipped to anticipate their guests' needs and target them individually in order to deliver customized products. For example, there are some technologies that are being tested in the labs at Hilton such as table top computers in lobbies to let people play games and order food, radio frequency identification devices in cards that could allow guests to check into rooms with little interaction with the front desk (Hoover, 2008). All these technology applications and interfaces are expected to enhance customers' experience with the hotel company so that they can possibly become valued repeat customers.

It appears that multiple stakeholders are involved in decision making related to technology projects including the technology officer, technology group within the hotel, technology committee across the company, as well as the headquarter office, and the working relationships between these groups differ based on the structure of the company and management style. However, one important aspect mentioned by nearly all the interviewed hotels regarding technology implementation and usage is the role played by the technology vendor or supplier. It is easily understandable that the technology implementation in the hotel industry is a process in which the hotels interact with the technology suppliers, actively or passively, researching and evaluating the products before selecting the one that seems to meet the company's needs

(Wang and Qualls, 2007). In this sense, how technology suppliers respond to and interact with the potential users becomes a pivotal issue. It is imperative that technology vendors and suppliers provide assistance and guidance throughout the implementation process.

The research results revealed that the organization technology environment played an important role in the effective use of technologies in the hotels. For example, all the interviewees mentioned that technology expertise of both management team and employees has a positive impact on how successful a technology implementation is. A higher degree of IT knowledge/skills of the work force as a whole may become more receptive to technological change, and it is easier for them to have a higher level of adaptation and integration of the technology into their work, thus reducing their resistance to the technology. In a market environment where a hotel's technology becomes a necessity to stay in business, technology, and managerial skills for e-business management become more significant. The necessity of managerial and technology skills urges top managers to promote the retention of employees and staff with managerial and technological e-business skills.

The interview results indicated that technology is an inseparable part of the hotel industry's distribution channel package, and they are using a variety of e-channels, individually or in combination. One trend sensed from the interviews is that hotels are switching more to their own channels for product distribution, such as the hotel's website, computer reservation systems, or CRS. In this process, conflicts will appear between the hotels' own channels and the channels used by third party distributors. Though they did not explicitly mention their concerns with such possible channel conflict management issues, hotel companies need to come up with strategies in dealing with multiple channels, including GDS, so that they can perfect their channel portfolio and maximize their revenue. For example, online wholesalers usually contract guaranteed blocks of hotel rooms in advance at a negotiated price, mark up these rooms by 15-30 percent, and then sell them to the end consumers. After selling a volume of rooms to online wholesalers, hotels may lose control over prices offered by online wholesalers (Lieber, 2003). The low prices offered by online wholesalers may make guests accustomed to low prices and encourage them to search for the "best deals." As a consequence, hotels might be forced to reduce their room rates and this eventually undercut their profit margins. More importantly, during this process, hotels are usually forced to surrender customer data, potentially the most important business information, into the hands of the third parties, which in turn hamper their efforts in customer relationship management. In order to avoid the risk of commoditization of the hotel rooms as well as the loss of customer data, hotels should control the margins and the extent of online wholesaling.

In terms of future technology trends, it appears that wireless technology will become the common platform for communication. Without a doubt, the emergence of mobile technology creates a myriad opportunities for hotel companies to enhance both product development and marketing strategy. Mobile technology allows users to complete service transactions or search for pertinent information anywhere, anytime. More importantly, wireless communication enables the hotels to not only monitor the constantly changing end-users' service expectation, but also to more efficiently provide individualized service as co-producer of services. Most of these activities can be conducted through the guests' wireless devices.

Conclusions

It is now generally agreed that ICTs are the single greatest force driving change in the hotel industry and will continue to have dramatic and sweeping implications on how hotels conduct business in the future. Hotels are expected to position themselves strongly on the internet to take advantage of its distribution capabilities such as reach, content dissemination, feedback collection, interactivity, and one-to-one marketing. Further, current trends indicate that this greater involvement in IT by the hotel industry will increasingly encompass customer-centric approaches to capitalize on the cost structure and long-term potential of the internet while at the same time differentiating products and building lasting value propositions. For many hospitality organizations, technological advances are at the vanguard of opportunity, yet they represent one of management's biggest challenges. Adopting and using new technology systems and processes entails complicated decision making that requires insights and inputs from strong research initiatives and organizational commitment. The current research contributes to the understanding of hospitality organization's technology strategies and addresses the call for more theoretical as well as empirical work to better examine the key issues related to technology strategies.

It should be pointed out that most of the studies in technology management are taking a technology deterministic or technology oriented approach, without understanding what the technology is used for. There is no exception in technology management research in hospitality and tourism. For example, in the area of hotel technology use, most of the studies are focusing on a laundry list of technology features/applications or taking a number crunching accounting approach with the expectation that these list and numbers would differentiate good technology use from bad ones. However, what determines whether a piece of technology is effective is not usually the technology itself, but rather, how and why the technology is used, whether the technology is aligned with organization's business strategy. Following this line of reasoning, in the implementation of technologies in the hotel industry, technologies should not be treated as the end game; rather, the focus should be on operation, information, communication and customer relationship management, since handling information and communication problems to facilitate operation and enhance customer experience should be ultimately the goal of technology implementation in the hotel industry.

References

Agarwal, R. and Prasad, J. (1998), "Are individual differences germane to the acceptance of new information technologies?", *Decision Sciences*, Vol. 30 No. 2, pp. 361-91.

Ajzen, I. and Fishbein, M. (1980), *Understanding Attitudes and Predicting Social Behavior*, Prentice-Hall, Englewood Cliffs, NJ.

Ariss, S.S., Kunnathar, A. and Raghunathan, T.S. (2000), "Factors affecting the adoption of advanced manufacturing technology in small firms", *Advanced Management Journal*, Vol. 65 No. 2, pp. 14-21.

Buhalis, D. (2003), *eTourism – Information Technology for Strategic Tourism Management*, Pearson Education, Harlow.

Carvell, S. and Quan, D. (2008), "Exotic reservations – low-price guarantees", *International Journal of Hospitality Management*, Vol. 27, pp. 162-9.

Cheong, J.H. and Park, M.C. (2005), "Mobile internet acceptance in Korea", *Internet Research*, Vol. 15 No. 2, pp. 125-40.

Cho, W. and Olsen, M.D. (1998), "A case study approach to understanding the impact of information technology on competitive advantage in the lodging industry", *Journal of Hospitality & Tourism Research*, Vol. 22 No. 4, pp. 376-94.

Davis, F. (1989), "Perceived usefulness, perceived ease of use, and user acceptance of information technology", *MIS Quarterly*, Vol. 13 No. 3, pp. 319-40.

Davis, F.D., Bagozzi, R.P. and Warshaw, P.R. (1989), "User acceptance of computer technology: a comparison of two theoretical models", *Management Science*, Vol. 35, pp. 982-1003.

Fishbein, M. and Ajzen, I. (1975), *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*, Addison-Wesley, New York, NY.

Goode, S. and Stevens, K. (2000), "An analysis of the business characteristics of adopters and non-adopters of world wide web technology", *Information Technology and Management*, Vol. 1, pp. 129-54.

Hoover, J.N. (2008), "Information week 500: IT extends Hilton's welcome mat", *Information Week*, available at: www.informationweek.com/shared/printableArticleSrc.jhtml?articleID= 210600639 (accessed September 17, 2008).

Lieber, R. (2003), "How to get a four-star hotel room at a two-star price", *Wall Street Journal*, January 30, p. D1.

Lodging Industry Technology Study (2004), available at: www.htmagazine.com (accessed November 2, 2008).

Marshall, C. and Rossman, G. (1999), *Designing Qualitative Research*, Sage, Newbury Park, CA.

Nyheim, P., McFadden, F. and Connolly, D. (2004), *Technology Strategies for the Hospitality Industry*, Pearson Prentice-Hall, Upper Saddle River, NJ.

Paul, R.A. (2005), "Vision 2010", *Hospitality Technology Magazine*, available at: www. htmagazine.com/ME2/dirmod.asp?sid=&nm=&type=MultiPublishing&mod= (accessed November 20, 2008).

Sigala, M. (2003), "Developing and benchmarking internet marketing strategies in the hotel sector in Greece", *Journal of Hospitality & Tourism Research*, Vol. 27 No. 4, pp. 375-401.

Siguaw, J.A., Enz, C.A. and Namasivayam, K. (2000), "Adoption of information technology in US hotels: strategically driven objectives", *Journal of Travel Research*, Vol. 39, pp. 192-201.

Singh, A.J. and 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 and Hospitality Research*, Vol. 6 No. 1, pp. 24-37.

Srinivasan, R., Lilien, G.L. and Rangaswamy, A. (2002), "The role of technological opportunism in radical technology adoption: an application to e-business", *Journal of Marketing*, Vol. 66 No. 3, pp. 47-60.

Tesone, D. (2006), *Hospitality Information Systems and e-Commerce*, Wiley, Hoboken, NJ.

Thong, J.Y.L. (1999), "An integrated model of information systems adoption in small businesses", *Journal of Management Information Systems*, Vol. 15 No. 4, pp. 187-214.

Venkatesh, V., Morris, M.G., Davis, G. and Davis, F. (2003), "User acceptance of information technology: towards a united view", *MIS Quarterly*, Vol. 27 No. 3, pp. 425-78.

Wang, Y.C. (2008a), "Collaborative destination marketing: roles and strategies of convention and visitors bureau", *Journal of Vacation Marketing*, Vol. 13 No. 3, pp. 187-203.

Wang, Y.C. (2008b), "Web-based destination marketing systems: assessing the critical success factors", *International Journal of Tourism Research*, Vol. 10, pp. 55-70.

Wang, Y. and Fesenmaier, D.R. (2006), "Identifying the success factors of web-based marketing strategy: an investigation of convention and visitors bureaux in the United States", *Journal of Travel Research*, Vol. 44 No. 3, pp. 239-49.

Wang, Y.C. and Qualls, W. (2007), "Technology adoption by hospitality organizations: towards a theoretical framework", *International Journal of Hospitality Management*, Vol. 26 No. 3, pp. 560-73.

Zhu, K. and Kraemer, K.L. (2005), "Post-adoption variations in usage and value of e-business by organizations: cross-country evidence from the retail industry", *Information Systems Research*, Vol. 16 No. 1, pp. 61-84.

Further reading

American Hotel and Lodging Association (2008), "2007 lodging industry profile", available at: www.ahla.com/content.aspx?id=23744 (accessed November 24, 2008).

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

Crowell, C. (2008), "Housekeeping communication gets more efficient, high-tech", *Hotel & Motel Management*, Vol. 34, p. 40.

Law, R. and Hsu, C.H.C. (2006), "Importance of hotel website dimensions and attributes: perceptions of online browsers and online purchasers", *Journal of Hospitality & Tourism Research*, Vol. 30 No. 3, pp. 295-312.

Ng, W. and Krantz, M. (2008), "Wi-Fi is biggest tech demand, says report on US hotels", *Meeting News*, Vol. 32 No. 14.

O'Conner, P. (1999), *Electronic Information Distribution in the Tourism and Hospitality Industry*, Oxford University Press, Oxford.

Rogers, E. (1983), *Diffusion of Innovations*, 3rd ed., The Free Press, New York, NY.

Rogers, E. (1995), *Diffusion of Innovations*, 4th ed., The Free Press, New York, NY.

Sobieski, J. (2008), "Technology today: how technology enhances the bottom line", *Lodging Hospitality*, September, pp. 62-5.

Squires, M. (2008), "Technology changes lodging workforce", *Lodging Hospitality*, June, pp. 44-50.

Thomas, G. (2008), "Redefining relationships with social networking", *Lodging Hospitality*, July, p. 22.

Wang, Y.C. (2005), "e-Commerce and information technology in hospitality and tourism", *Journal of Teaching in Travel and Tourism*, Vol. 5 No. 4, pp. 71-5.

Wang, Y.C. (2008), "Examining the level of sophistication and success of destination marketing systems: impacts of organizational factors", *Journal of Travel and Tourism Marketing*, Vol. 24 No. 1, pp. 81-98.

Yeoman, I. and McMahon-Beattie, U. (2006), "Tomorrow's tourist and the information society", *Journal of Vacation Marketing*, Vol. 12 No. 3, pp. 269-91.

Appendix. Interview questions

Characteristics of property

    (1)   Name of hotel.

    (2)   Name of company.

    (3)   Type of hotel (i.e. independently owned, franchised, etc.).

(4) The primary markets for your hotel (i.e. leisure, business, etc.).

(5) Number of guestrooms.

(6) Non-room amenities (i.e. restaurant, pool, gift shop, golf course, etc.).

Impact of technology use

(1) What type of technology has more impact to your hotel business: operations, customer service or marketing? Why?

(2) What is the benefit of implementing the technology? (e.g. who benefits? property? employees? guests?)

(3) How does the technology that you employ in your business help your associates do their jobs better?

(4) How does technology impact the human resources in your business?

(5) How does the technology that you employ in your business impact guest service in your business?

Technology adoption and implementation

(1) What are the most important factors affecting the success of implementing the technology?

(2) What are the constraints for implementing the technology that you want/need?

(3) What factors limit the use of and investment in the technology in your property?

(4) How do you learn about which brand to choose for each technology?

(5) Who mainly decides on your hotel's technology strategy?

Organization technology environment

(1) How would you rate your management team's knowledge/skills with the technology?

(2) How would you rate your employees' knowledge/skills with the technology?

(3) How would you rate your management team's support of technology adoption and implementation?

(4) How would you evaluate your management team's direct involvement related to technology operations?

(5) Do you provide training programs related to new technology for employees?

(6) Do you train all employees or just management level personnel?

Distribution channels

(1) What are major distribution channels your hotel is using? (e.g. website, central reservation system, toll-free reservation call centers, conventional travel agents, third party travel booking websites, e-travel agents (i.e. Expedia, Hotels.com), event booking centers, GDS).

(2) What are the major factors you consider when you decide which channel to use? (e.g. reach, richness, cost, effectiveness).

(3) Looking into future, are you planning to use more direct channels of your own (e.g. hotel website, CRS, call center) or third party service? Why?

Technology trends

(1) How aware are you about the current trends in terms of technology in the hotel industry?

(2) What types of technology do you plan to adopt at your property in the near future?

(3) Do you think it is important to keep up with new technology? Why?

(4) How has the use of technology in your particular business changed over the past ten (five) years?

(5) The airlines have adopted more self-service options into their operations, are there any benefits to adopting more self-service options into hotel and restaurant operations?

(6) What new technologies are emerging for your industry and how will they potentially impact the human resource and guest service of your business?

Corresponding author
Robin B. DiPietro can be contacted at: rdipietr@mailbox.sc.edu