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Can Kiosk Machines and Business Intelligence Replace the Hotel Front-Desk Representative?

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ABSTRACT

Information Technology has played an important role in the hospitality industry, and its importance is expected to increase. From early deployments in operational areas such as reservation and property management, technology has moved into customer relationship management role, to the point where technology can even replace the front desk representative. This paper provides a brief review of how technology has impacted the hotel industry over time, and how the role of technology will likely play out in the future. We close by proposing a decision framework for hotel operators considering investing in information technology.

KEYWORDS: Hotel Industry, Information Technology, Business Intelligence, Kiosk

INTRODUCTION

Customer satisfaction and loyalty have long been critical to the hospitality industry (Bowen & Chen, 2001). Loyal customers, through positive word-of-mouth, can promote a hotel's business. In the past, customer loyalty and satisfaction have been built by the hotel staff, defined as a well-trained and detail-oriented workforce. Teamwork, communication, and knowledge transfer have always been a key part of a successful hotel operation, but this has been made difficult due to dynamics unique to the industry. According to the U.S. Department of Labor (2016), 15 million individuals were employed (full-time) in the hospitality industry. Most hotel guest representative jobs are entry level, with lower wages versus other jobs, and so the turnover rate is high. Hotel operators often face recruitment and retention difficulties with regard to guest representatives (Ong, 2010). So, even though the guest representative is critical in providing consistent high quality customer service, this is often difficult to accomplish due to the real-world pricing and wage constraints in the industry.

Over the years, information technologies have been introduced into the hotel industry, which has helped operators improve their ability to compete in this data-rich but low-wage (and high-turnover) environment. Early information technologies focused on site operations and revenue management (Korte, Ariyachandra, & Frolick, 2013). Technology and systems then helped enhance brand loyalty programs, which record guest preferences, manage future reservations (Capizzi & Ferguson, 2005), and can be used worldwide. More recently, business intelligence systems have leveraged this customer and operational data, which combines guest information with hotel information to further improve customer satisfaction and chain profitability.

Now, a new technology - kiosk machines - has the potential to further disrupt the industry. Kiosk technology can not only automate the check-in and check-out processes, but can also utilize

stored guest information and preferences, such that suitable rooms and even dining suggestions can instantly be provided. In fact, customers can use kiosks with already-available mobile-booking applications to complete their entire stay process, all without ever seeing the traditional front desk representative. Thus, kiosk technology can not only reduce labor costs, but can also provide accurate and consistent service to guests, all the while collecting additional guest information that can be leveraged for future analyses (Ong, 2010).

Adopting this new kiosk technology will likely have a large impact on the hotel industry. From the hotel operators' perspective, kiosk technology can provide a host of benefits, including addressing the guest representative shortage and turnover problems, and better data accuracy. However, it is not yet known how well customers will accept and adapt to the kiosk technology, because the front-desk representative is so entrenched in the industry. And while kiosk technology certainly poses as a threat on guest representative employment and future job security, the guest representative job is unlikely to go away anytime soon. In fact, guest representatives who deliver top customer service and who are able to work well with technology and data may be in even greater demand.

In this paper, we provide an overview of the historical relationship between technology and the hotel industry, and how this relationship is likely to evolve in the future. We offer a framework for hotel operators regarding the adoption of kiosk technology, and advice to guest representatives on how to stay relevant in this ever-changing industry.

LITERATURE REVIEW

The hotel industry has long used information technology to help its front desk representatives do their jobs better, and this trend will likely continue and may take a very disruptive path in the future.

Information technology to improve hotel operations

Hotels first developed property management systems (PMS), which focused on accounting and audit, security, and sales and marketing (Pucciani & Murphy, 2011). These systems were first deployed locally, but then became linked to a chain's central PMS, such that hotel chains had better operating visibility into all its properties. The room reservation and point-of-sales (POS) systems were interlinked to a central reservation system (CRS), which meant that guest information and reservations were accessible to front line guest representatives in all the chain's properties. Hotel chains soon moved into the next technology, by integrating their CRS with newly established customer loyalty programs.

Information technology to improve customer satisfaction and loyalty

Customer satisfaction and customer loyalty have a positive relationship (Bowen & Chen, 2001), and the front desk representative and the technology at his/her disposal are critical. In the hotel industry, customer satisfaction is primarily affected by the interaction between front line customer representatives and the guest (Ong, 2010). Customer satisfaction typically depends on the ease and professionalism of reservation and check-in processes. If the customer is satisfied with these processes, then it is very likely that he/she will remain loyal to the chain. Customer loyalty can be further enhanced by a well-run rewards program, which leads to repeat purchase behavior, better long-term relationships, and continuing profits (Laškarin, 2013).

A customer rewards program, like the hotel chain's predecessor PMS and CRS, necessarily

depend on correct data to run properly. This has become complicated by online travel agent (OTA) booking systems, which are reservation platforms maintained by third-parties such as Expedia, Orbitz, and Booking.com. An OTA system does not always link directly to the chain's CRS, because an OTA is typically assigned a specific number of rooms to work with, so reservations handled by the OTA often are batch-updated to the chain's CRS. Thus, front desk representatives often don't have visibility into guest and room reservations as quickly as when a reservation is made directly through the chain's CRS. This can negatively affect the customer's satisfaction with the reservation process. Moreover, reservations made through an OTA typically will not automatically be counted toward the customer's reward program, unless the guest goes to the front desk staff, who often must manually add the reservation to the guest's reward programs. Therefore, the front desk representative plays a crucial role in maintaining customer satisfaction when reservations are made through an OTA.

Customer Relationship Management and Business Intelligence

Hotel chains have looked to further leverage the technologies focused on operations and customer satisfaction through the use of customer relationship management (CRM) and business intelligence (BI). For example, CRM can allow hotel operators to receive feedback directly from their customers (Capizzi & Ferguson, 2005), which is then used to further improve and customize the guest experience. The Marriott Group administers its own Guest Satisfaction Survey, and Best Western contracts with a third-party company (MEDALLIA) to collect customer feedback. A CRM system can supplement this feedback with data from other sources, such as social media (e.g. Facebook, Yelp, and TripAdvisor), which can also influence customer satisfaction (Rosman & Stuhura, 2013).

Business intelligence programs combine operational and customer data with analytic tools to present insights, patterns, trends, and competitive information to managers for decision-making (ĐEKIĆ, 2010). Business intelligence programs in the hotel industry include the property management system (PMS), central reservation system (CRS), customer relation management (CRM), customer reward program system, property database system, internal payroll system, and point of sale system (POS) (Korte, Ariyachandra, & Frolick, 2013). These data can be interlinked in a data warehouse system and delivered to a user for analysis. Hotel operators can use business intelligence to understand the guests' preference and their shopping patterns. For example, the Marriott Rewards Program shows each member's contribution and status to support managers when they set the possible price range for rooms.

Hotel Information Technologies and Dirty Data

With so much information technology in use by hotel chains, whether it be technology focused on internal operations or focused on the customer, it is crucial that front desk representatives understand the importance of data accuracy. Dirty data refers to data that is erroneous, misleading, inappropriate, duplicated, or without correct formatting, all of which can result in poor decisions with lost time and money (Redman, 2016). For example, customers typically give feedback directly to the front-line customer service representatives about the perception of the room rate, cleanliness, and overall experience. The front-line employees then record this feedback into the CRM system. However, when guests provide this feedback orally, then the employee must interpret, transform, and input these sentiments into CRM system, which may or may not be accurate.

Another example comes from corporate room reservations, which becomes the major factor when determining the discount a company receives next year. During the check-in process, it

typically is not mandatory that guest information include the complete corporate name. If front desk representatives are not vigilant and consistent in entering the name of the corporation on the reservation, then the contribution level of the corporation (and hence their discount next year) will be under estimated. This and other front desk activities often result in missing data or inaccurate data entry.

Problem and Proposed Solution

Over the years, the hotel industry has utilized technology to automate many of its manual processes (e.g. sales, reservations) and improve customer satisfaction and loyalty. The check-in and check-out process, however, has remained as one of the most human-dependent activities, because the role of the front desk representative is so entrenched in the industry. However, the turnover rate among front desk representatives is very high, which means that the front desk is often manned by an inexperienced staff. This not only creates extra on-boarding and training costs for the chain, but can also negatively affect customer satisfaction and loyalty. In addition, data problems can easily occur during the check-in and check-out process, especially with an inexperienced staff.

A new technology – kiosk machines – may be ready to augment, if not fully replace, the manual check-in and check-out process. In other service industries, a host of self-service technologies (SST) help companies streamline transaction processes, reduce human cost, and potentially increase revenue (Kimes & Collier, 2015). For example, mobile apps already allow customers to conduct a wide array of banking transactions, and tickets for sports and other entertainment events can be purchased completely online. Kiosk machines are now common in the airline industry for customer check-in, and more and more retail chains use kiosks to allow faster customer check-out.

Customers are also becoming more comfortable with technology, and might be amenable to technologies that speed the hotel check-in and check-out processes. Hotel customers can already book reservations without talking to a live reservation agent. When guests arrive at the hotel, a kiosk would allow them to check-in, which could both speed the process and reduce data errors. There may be no need to stop by the concierge desk to ask for information, because guests can use the kiosk machines to obtain customized to their needs. It is conceivable that during the customers' entire stay, there may be little need to have contact with any front-line guest service representatives.

Ultimately, the kiosks could become part of a suite of SST, that could be incorporated into the chain's BI program, as shown in Figure 1 below.

Figure 1: Proposed Business Intelligence Program for Hospitality Management

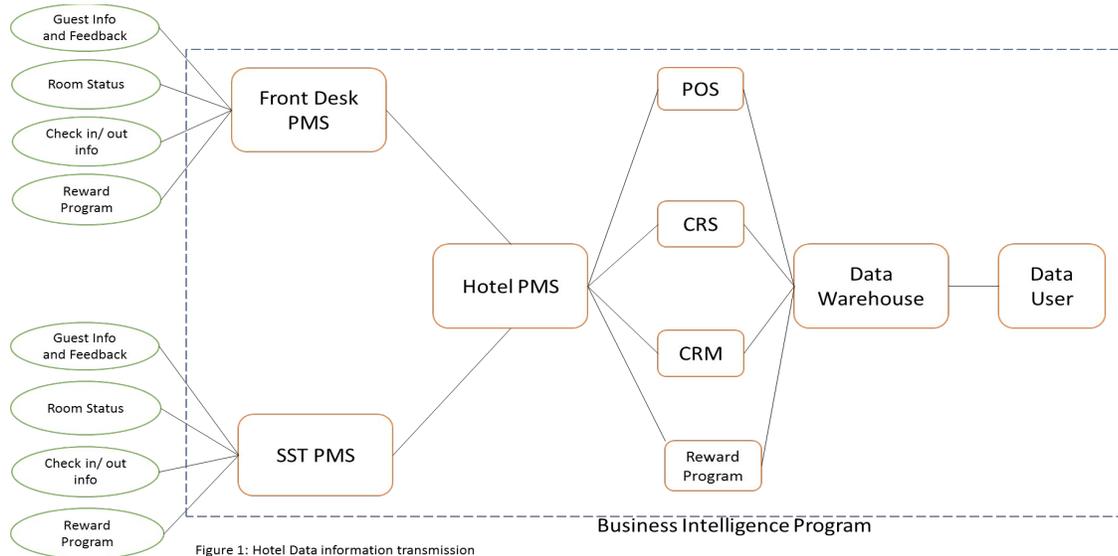


Figure 1: Hotel Data information transmission
 Source: adopted from Pucciani & Murphy, 2011; Korte, Ariyachandra, & Frolick, 2013

As shown in Figure 1, the SST PMS (which include kiosks) could do everything the Front Desk PMS can do, and thus would act as supplement to the Front Desk PMS. It is possible that over time, as SST capabilities improve and customer acceptance of SST increases, that SST may actually replace the Front Desk PMS at some hotels.

ANTICIPATED RESULTS

For hotel operators, revenue and profits are critical, and these are driven largely by customer satisfaction and customer loyalty (Bowen & Chen, 2001). While front desk representatives are an important determinant of customer satisfaction and customer loyalty, it is conceivable that SST combined with BI could augment (if not largely supplant) the front desk representative in this regard. Therefore, we argue that a fully connected BI program along with SST will be a future trend in the hotel industry. However, not every type of hotel chain or independently owned hotel will be able to adopt the SST and BI shown in Figure 1. Therefore, we propose a four-factor framework that will help hotel operators make a more informed decision before adopt the proposed SST and BI framework into their businesses.

Factor 1 - Hotel size. Hotel operators should evaluate their hotel size before they adopt the SST - BI framework. In the hotel industry, a with less than 100 rooms is considered small. A small size hotel also includes those that do not have in-house dining facilities. With fewer guest check-ins and less demand for dining services, front desk representatives likely have more time to interact with customers. Therefore, the full SST-BI framework proposed in Figure 1 may not be necessary. Instead, a CRS and PMS that focuses on improving guest information processing, such as history, arrival, and departure (Paraskeval & Buhalis, 2002) would likely be sufficient, reducing the need for SST.

Factor 2 - Hotel ownership. Hotel ownership means independently owned versus chain hotel systems. An independently owned hotel is financed by one person or a small group and is directly managed by an owner (Paraskeval & Buhalis, 2002). In this type of hotel, operators will

need to build their own PMS, CRM, and/or reward systems, or work with third-parties. On the other hand, a hotel chain will need a fully-integrated BI system, which can include SST (with kiosks) at appropriate properties. These properties need to have guest profiles that match what SST (and kiosks) provide, which include but are not limited to being technology-friendly, price-conscious, and who have little need for front desk interaction. For example, the Marriott Group has over 3,500 locations and \$12 billion in revenue, with many brands that have different price points and service levels. So while each Marriott property can be interlinked into one BI program, certain properties (e.g. Fairfield or Springhill Suites) may be more amenable to SST than other brands (e.g. Ritz-Carlton or St. Regis).

Factor 3 - Budget. Hotel operators need to consider how much capital can be invested into adopting SST-BI programs. As with Factor 2, an independently owned hotel will use different strategies than chain hotel properties. A complete BI program includes the property management system (PMS), central reservation system (CRS), customer relation management (CRM), customer reward program system, property database system, internal payroll system, point of sale system (POS), and employee training (Korte et al, 2013). Independently owned hotels may not be able to finish the entire program build-up at once. It will need hotel operators to take steps to complete. They also need to think which part is a top priority and has a direct effect on the company's cost management.

Factor 4 - Database system management. In this factor, customer data usage needs to be considered. For hotel operators, BI programs can identify new revenue streams and test strategies (Korte et al, 2013). If a hotel operator does not use customers' history data for the future data analysis or forecast, it will be unnecessary for them to adopt BI programs into their businesses.

Long term, it is likely that the proposed SST-BI framework (Figure 1) will replace many front desk representative jobs. However, this will likely only occur at specific properties (i.e. those with technology-friendly guests, lower price points, and guests who require minimum front-desk interaction). For higher-end properties, where face-to-face interaction with a front desk professional is still the norm, it is doubtful that any SST with kiosks could gain much traction. Moreover, even in properties that implement the proposed SST-BI framework, front desk representative may very well become even more important, if SST and/or kiosks have operational problems.

DISCUSSION AND CONCLUSIONS

For hotel operators, the four-factor framework can help them gain a better understanding of what is required to deploy SST and BI programs in their businesses. Implementing SST and BI programs can be very costly and time consuming. In addition, it will take time and capital to train employees on how to use the programs properly. If there is no funding and top-management support, then the hotel will not be able to roll out the BI program at the hotel (Ong, 2010). Therefore, proper planning and budgeting must occur well in advance of any SST-BI rollout.

Not every hotel will need to adopt an SST- BI program immediately. The Hilton Hotel group was the first to introduce Kiosk machines in the hotel industry (in 1997). However, it took Hilton many years and much money to adjust its system to meet market request (Korte et al, 2013). The guest experience was not positive, because the system was not able to re-modify guest reservations, and the operation interface was not user friendly. Guests did not save time at self-check in, but to the contrary, had to walk back to the waiting line and wait for the front desk representatives to redo the work. Another reason that the Hilton Kiosk machine failed was the

guest culture and hotel atmosphere was not yet ready (Ong, 2010). Traditionally, hotel lobbies are meant to be warm and welcoming, but the placement of these machines in the lobbies did not fit into the traditional design. Customers still feel more comfortable talking to a live front desk agent, instead of pressing buttons and talking to answering machines. Eventually, Hilton's kiosk machines were able to successfully perform routine check-ins, and also provide restaurant coupons and other information useful for the guest.

The hotel industry leader, Marriott, runs one of the best CRM and rewards program system. The Marriott BI system can look up the member status and level, room inventory, and possible pricing range for every customer and every property, with analyses completed almost instantly. However, Marriott still needs customer service representatives to deliver the results because the core value of service is people. When the hotel's service exceeds customer expectations, the result is customer satisfaction that leads to customer loyalty (Laškarin, 2013). But when mistakes invariably happen, hotels still need well-trained customer service representatives to take appropriate service recovery actions as quickly as possible (Ong, 2010).

There are two limitations of this research paper. First, when hotel operators use the four-factor framework to determine whether they will implement BI programs, database system management factors will be over-estimated on its hotel capability. Some managers do not acquire enough knowledge about how to use that customer data information or they do not have a data scientist to help them analyze the data. That data will then become useless. The second limitation will be employee training. It is necessary to train the employee to become familiar with the SST and BI programs. Front-line customer service representatives, as well as hotel operators, must be equipped with knowledge and the ability to cope with the changing levels of implementing SST and BI programs to apply the relevant information in work areas. This will allow front-line customer service representatives to interact and assist their customers on how to use the SST and BI programs.

In conclusion, the hotel industry seems ripe for the next innovation in information technology, which will incorporate SST and kiosks, with positive implications for the hotel's BI programs and potentially negative implications for front desk representative employment. However, these outcomes will likely take place slowly, as hotels learn how, when, and where to integrate SST and kiosks into their guest experience. Even at properties where SST and kiosks are implemented, it is also likely that some front desk representative roles may expand, to assist those guests who still need help. Either way, disruptive change is once again coming to the hotel industry, and forward-thinking organizations can use the proposed four-factor framework to develop a workable plan.

REFERENCES

- Bowen, J. T., & Chen, S.-L. (2001). The relationship between customer loyalty and customer satisfaction. *International Journal of Contemporary Hospitality Management*, 13(4/5), pp. 213-217.
- Capizzi, M. T., & Ferguson, R. (2005). Loyalty Trend for 21st Century. *The Journal of Consumer Marketing*. 22(2), 72-80.
- ĐEKIĆ, T. (2010). Possibilities of using business intelligence. *Tourism & Hospitality Management 2010*, pp. 1407-1415.
- Ip, C., Leung, R., & Law, R. (2011). Progress and development of information and communication technologies in hospitality. *International Journal of Contemporary Hospitality Management*, 23(4), pp. 533-551.
- Kimes, S. E., & Collier, J. E. (2015). How Customers View Self-Service Technologies. *MIT Sloan Management Review*, 57(1), 25-26.
- Korte, D., Ariyachandra, T., & Frolick, M. (2013). Business intelligence in the hospitality industry. *International Journal of Innovation, Management and Technology*, 4(4), pp. 429-434.
- Laškarić, M. (2013). Development of loyalty programmes in the hotel industry. *Tourism and Hospitality Management*, 19(1), pp. 109-123.
- Noonea, B. M., McGuireb, K. A., & Rohlfs, K. V. (2011). Social media meets hotel revenue management: Opportunities, issues and unanswered questions. *Journal of Revenue and Pricing Management*. 10(4), pp. 293-305.
- Ong, L. (2010). Can self service technologies work in the hotel industry in Singapore? A conceptual framework for adopting self service technology. *UNLV Theses*, pp. 1-45.
- Paraskevas, A., & Buhalis, D. (2002). Outsourcing IT for small hotels. *Cornell Hotel and Restaurant Administration Quarterly*, 43(2), pp. 27-39.
- Pucciani, K. K., & Murphy, H. C. (2011). An investigation of data management and property management systems in hotels. *Tourism and Hospitality Management*, 17(1), pp. 101-114.
- Redman, T. C. (2016, 09 22). *Bad data costs the U.S. \$3 trillion per year*. Retrieved from Harvard Business Review: <https://hbr.org/2016/09/bad-data-costs-the-u-s-3-trillion-per-year>
- Rosman, R., & Stuhura, K. (2013). The implications of social media on customer relationship management and the hospitality industry. *Journal of Management Policy and Practice*, 14(3), pp. 18-26.
- U.S. Department of Labor. (2016). *About the leisure and hospitality supersector*. Retrieved from U.S. Department of Labor: <http://www.bls.gov/iag/tgs/iag70.htm>

Vasudev, M. (2015, 02 21). *What is bad data and its side-effects?* Retrieved from B2C Business 2 community: <http://www.business2community.com/big-data/bad-data-side-effects-01164045#EUm2QgjRuARmRrJG.97>