Travelers’ Perception of SMART Technologies in Hotel Industry

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Abstract

Even though smart technologies are relatively new, they have a crucial role in businesses operations. This research was conducted with an intent to investigate which smart technologies are attractive to travelers and which are undesired to travelers. Hundred and twenty-five participants with previous experiences of smart technologies during their hotel stay were surveyed based on Kano's model in order to measure attractiveness of smart technologies. Results suggest that travelers do not find smart technologies attractive in most circumstances as there are lots of privacy concerns.

Keywords: smart technology, Internet of Things, smart hotel, customer satisfaction, Kano model,

Introduction

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In the last seven years, since Starwood Hotels have introduced the first keyless entry over SPG mobile application, many hotel chains, e.g. Hilton and Marriott International, have seen benefits of implementing smart technology in their properties (Nguyen, 2020). Since then, advanced technologies have reshaped the hospitality industry by allowing hoteliers to introduce new services, create new market for technologically savvy travelers, and most importantly, enabling them manage their companies more efficiently (Praničević, Mandić, 2020).

Since the introduction of keyless systems and continuous technological advances, hotel groups like Aloft, Hilton, Wynn Resorts and Marriott International have invested in smart technologies, more precisely in voice assistants such as Apple Siri's in-room tablets, Amazon Echo speakers, and Alexa for Hospitality. (Buhalis, Moldavska, 2021).

According to the results of a recent study, smart in-room technology ranked third as most valuable amenity provided by the hotel, while free Wi-Fi was ranked first. In addition to being valuable, smart technology also provides hoteliers with additional revenue as they are able to charge higher rates or extra for smart amenities that guests wish to use. The research also argued that smart technology will become the main differentiator for hotel businesses in the twenty-first century due to the increasing awareness and sophistication among travelers (Bilgihan et al, 2016).

On the other side, some analyses of smart hotel reviews on Online Travel Agencies (OTA) have shown that, even though hotels have adopted smart technologies like smart rooms, smart guest check-in, etc., the processes at smart hotels are still almost identical to the processes at traditional hotels. Moreover, most of the negative reviews are connected to issues with the

services which is due to loss of ability to critically think and loss of involvement as the hotel staff became dependent on smart technology (Peng, Zhang, 2020). Hotels that received negative reviews seemed to believe that customer satisfaction will increase just because smart technology was implemented. This is false because, in addition to technologies, there should also be staff using them to better personalize services and ultimately create the high-tech/ high-touch experiences.

Defining Smart Technology, ICT, and Internet of Things

The term "smart" has multiple meanings. The word is an abbreviation of the phrase "self-monitoring analysis and reporting technology" which means that, for example, in smart hotels there is little or no need for human participation in processes, as smart technology analyzes and communicates with both external and internal surroundings (Jaremen et al, 2016). That means that smart technologies enable inanimate objects to become aware of the real world and data around them in real time which allows them to act on their own or help people in making better business decisions (Gretzel et al, 2015).

Closely connected to smart technology is the ICT which stands for "information and communications technology". Similar to smart technology, ICT collects information, performs analysis and implements results into its systems which increases profitability, management and performance effectiveness, as well as enhances guest experiences (Jaremen et al, 2016). As ICTs are a prerequisite to implement smart technology, it means that innovations in ICTs are responsible for most current changes happening in the hotel and tourism industry. As opposed to smart technology, innovations in ICT are predominantly directed to making communication with customers easier in the context of marketing, meaning that ICTs are not interactive while smart technologies are (Miočić et al, 2012). Furthermore, according to Stankov et al (2019), if

used properly, ICTs can create multiple options for businesses for enhancing customer satisfaction, but can also damage guests experience through failure of systems or design.

However, due to an increased interest in Internet of Things (IoT) in the last decade, the number of system failures and poor design in ICT has decreased, since IoT has enabled ICTs as well as smart technologies to be interconnected. The definition of IoT is the interconnectivity of devices through various sensors enabling them to sense the environment, share information between devices and even carry out different tasks and requests (Amer, Alqhtani, 2019). For example, in hotels when a dishwasher in the kitchen requires service, it immediately informs the manufacturers that it needs to be serviced or updated. Updates can be done remotely and directly from the factory and there is no need physically "visit" the machine. In addition, because of integration of IoT with ICTs, hotel rooms will be able to change temperature depending on the body temperature, outside temperature, as well as react to other objects depending on their chemical composition and temperature (Lopez et al, 2012). Mercan et al (2020) state that, not only IoT can help in predicting guest's needs through various sensors and intelligence, but also it can learn physical location of guests inside hotels through various cameras and wearables, enabling them to create real-time content by having guest's previous data.

Defining Smart Rooms and Smart Hotels

The term "smart hotel", according to Nguyen (2020), is a lodging facility that uses IoT, AI (artificial intelligence), machine learning and various high-tech solutions to their operational systems that are aimed at enhancing guest satisfaction and experience, as well as to save labor. Smart rooms and hotels are relatively new to the market as they were introduced only ten years ago in 2011 when The Comfort Xpress Hotel was opened in Oslo, Norway. It was the first fully

automated hotel as it pioneered the introduction of 100% automated check-in and departure, as well as customer service without human personnel.

Beside The Comfort Xpress Hotel, another hotel is recognized as a smart pioneer: Hotel Henn-Na, which opened in 2015 in Sasebo, Nagasaki, was the first smart hotel to be operated solely by robots and other automated devices. Since then, there has been a significant increase of hotels turning smart, especially after the COVID-19 outbreak which put smart hotels in the center of attention given the lower risk of transmission of the virus among people (Peng, Zhang, 2020).

Furthermore, Petrevska et al (2020) define smart rooms as hotel rooms with stations with processors that continuously monitor various parameters crucial for normal functioning, e. g. controlling the temperature and monitoring movement of the guests in and out of their rooms. In addition to that, Miočić et al (2012) state that smart rooms are able to also control objects like shutters, lights, bathrooms, alarms, TV's, and other media either manually or automatically through switches, sensors, remote TV controls and even weather-controlled stations.

Having only smart rooms at the property does not necessarily mean that the hotel is also smart. All the rooms, and objects within the property have to be interconnected so that the hotel knows where their guests are from the second they arrive until they leave the property (Petrevska et al, 2020). Both Petrevska et al (2020) and Kim et al (2021) agree that technology itself is not enough for hotels to be considered as "smart". There both must be implementation and integration of ICTs, IoT, and smart technology as well as a component of human touch.

Current dilemmas and research goal

Various studies conducted so far with the purpose of investigating the link between smart technology in hotels and guest satisfaction have shown undecisive results. According to some,

hotel owners believed that smart technologies were important in creating relationships with customers. However, hotel owners put much more importance into smart technologies by believing that they will bring more satisfaction to customers than they in reality do (Praničević, Mandić, 2020). On the other side, Nguyen (2020) found that Millennials, now a dominant generation of travelers, positively perceive smart technologies and have a positive attitude toward hotels implementing smart technologies despite the challenges and risks that smart technologies brings.

The purpose of this research is to shed more light into the current dilemmas of whether smart technology in hotel rooms has a positive influence on customer satisfaction. We decided to use the Kano model (1984) because it can determine whether a particular feature satisfies or even delights the guest, and can also prioritize and categorize features based on their desirability.

Method

In our particular research approach, we wanted to get an insight into the customer's perception of smart technologies, namely clarify which smart technologies positively influence customer satisfaction and which smart technologies should be discarded as they negatively influence customer satisfaction. The Kano questionnaire type used in the research shows six requirements that customers have: "must be", "one-dimensional", "attractive", "indifferent", "reverse", and "questionable".

Our questionnaire was created in order to identify smart technologies that hotels guests find the most satisfying, which is important from the point of view that customer satisfaction indicates the perceived customer value which can be directly correlated with the price they are ready to pay as hoteliers and investors believe that by implementing such technologies will help their hotels improve their brand image and reputation, as well as bring good financial return through usage of smart technologies in pricing strategies (Leung, 2019).

Chosen participants of this research were travelers who have experienced smart technologies during their hotel stays. Questions were made based on previous researches that were conducted. In the given questionnaire, there were 16 questions that followed Kano's two-dimensional effective approach (1984) that resulted in each question being asked twice in opposite functional and dysfunctional approaches. For each smart technology used by hotels, a positive question (functional approach) and a negative question (dysfunctional approach) was asked to unbiasedly determine smart technology features that are positively and negatively perceived by the customers.

Our questions were made developed based on Franušić & Kužnin's (2015) questionnaire and readjusted as to be relevant for the purpose of this research. The questionnaire was posted in Facebook and Reddit Croatian groups dedicated to travel.

Results

We received 126 completed questionnaires from respondents between 18 and 65 years of age. Only one reply out of 126 was invalid due to questionable answers. The 125 collected valid answers were analyzed in order to find out which out of eight given technologies the customers perceive as bringing value. The answers were subsequently analyzed based on Kano's (1984) six customer requirements model and placed in an evaluation table in order to check which smart hotel technologies are perceived as attractive, questionable, undesired, unimportant, must-be or one-dimensional. The results presented in Table 1 showed that out of those eight smart hotel technologies currently implemented world-wide, only two were perceived as attractive by the participants. The other six technologies were perceived as not valuable.

Table 1: Attractiveness of smart technologies to travelers based on Kano model

No.	Functional/Dysfunctional Approach	Results		
1.	F: If you are greeted and checked-in by an robot upon your arrival, how do you feel?			
		Undesired	Unimportant	Attractive
2	D: If you are greeted and checked-in by a human instead of robot upon your arrival, how do you feel?	46,4%	29,6%	20%
3	F: If your hotel room amenities are controlled by voice assistant, how do you feel?			
		Undesired	Unimportant	Attractive
4	D: If your hotel room amenities are not controlled by voice assistant, how do you feel?	36,8%	32%	27,2%
5	F: If the hotel you are staying at collects various personal data, how do you feel?			
		Undesired	Unimportant	Attractive
6	D: If the hotel you are staying at does not collect various personal data, how do you feel?	77,6%	16,8%	2,4%
7	F: If the check-in process is fully automated (done through an app), how do you feel?			
		Undesired	Unimportant	Attractive
8	D: If the check-in process is traditionally done, how do you feel?	24%	20,8%	49,6%
9	F: If the hotel you are staying at is fully automated, how do you feel?			
		Undesired	Unimportant	Attractive
10	D: If the hotel you are staying at is not automated at all, how do you feel?	41,6%	31,2%	22,4%
11	F: If the hotel room is covered with sensors that track your movements and various parameters, how do you feel?			
		Undesired	Unimportant	Attractive
12	D: If the hotel room is not covered with sensors that track your movements and various parameters, how do you feel?	77,4%	20%	4%
13	F: If the hotel room automatically "knows" when to turn on lights, adjust temperature and control shutters, how do you feel?			
		Undesired	Unimportant	Attractive
14	D: If you have to manually turn on lights, adjust temperature and open/close shutters, how do you feel?	28%	24%	42,4%
15	F: If services like F&B and housekeeping are performed by automated robots, how do you feel?			
		Undesired	Unimportant	Attractive
		40,8%	31,2%	21,6%

16	D: If services like F&B and housekeeping are not performed by automated robots, how do you feel?

Discussion

Given the current almost exponential growth in introducing new technologies, we were under the impression, before we started our research, that travelers have started to value smart technology (high tech) more than human touch (high touch) and that smart technologies increase customer satisfaction during hotel stay. However, both hypotheses have proven to be wrong.

As seen from the results, guests still value human-to-human interaction and service more than they value technological solutions. In addition, introducing smart technologies will not positively influence customer satisfaction in most circumstances; either there will be an increase in dissatisfaction or there will not be any influence. However, some implementations should be acknowledged and implemented at some point as they have capability to increase satisfaction. Having the ability to check-in at a hotel beside having traditional check-in at the reception will bring value as customers will not have to wait in line if they are in a hurry (83 out of 125 participants either liked it or expected it while only 10 said they dislike the automated check-in). Additionally, according to results, having smart lights and air conditioning is worth implementing as, much like with automated check-in, shortens the time that is required to adjust temperature, shutters etc.

Such technological solutions should be considered for implementation as they do not remove human touch, which is important to the guests as seen from the results. They do in turn save time, which is a precious commodity nowadays, as well as it hotel stay seamless. However, as shown in results, customers value their privacy and data privacy over everything else. Having

smart air-conditioning means that it is equipped with the sensors that track their body temperature and readjust room temperature accordingly. Those sensors are the same sensors that were mentioned in the question “If the hotel room is covered with sensors that track your movements and various parameters, how do you feel?”, which scored the most negative score with 88 out of 125 participants disliking it, followed by “If the hotel you are staying at collects various personal data, how do you feel?” question with 76 participants disliking the idea.

That being said, these findings show that travelers are still not knowledgeable about smart technologies and that brings to question whether it is worth to even implement such technologies like smart window shutters or air conditions at this point as it is probable that travelers will become more knowledgeable about such devices and such technological implementations will move from being attractive and bringing delight to customers to being undesired and a huge problem for some customers who value their privacy in extreme measures.

As customers care about their data privacy, it is safe to say that it is more desirable to implement the non-invasive technological solutions such as concierge robots, like Hilton did in some of its flagship hotels. Even though results showed that having robots as concierge or receptionist is an undesired requirement according to Dr. Kano’s model, when looking solely at the functional question: “If you are greeted and checked-in by a robot upon your arrival, how do you feel?” answers were fairly distributed; 35 liked the requirement, 35 disliked, and 35 were neutral about having a robot as a concierge or receptionist it which implies that it could bring value to guests, if combined with having traditional concierges and receptionists for those who incline more to having human-to-human interaction.

Some services on the other side, should stay solely human-to-human such as serving food and beverages to customers as eating is perceived as a social activity meaning that they want also

to be served by people. As eating in restaurants has become almost a miniature event itself, due to now trending open kitchen concepts, which brings more socialization, and translating whole stories on plates, it is expected of waiters to convey the whole story and transform it into an unforgettable experience. Therefore, robotization of such services should be avoided.

Limitations

The limitations of this paper are that the sample size is relatively small. Connected to that, most of participants are from Croatia and Balkan area, meaning that the results could have differed if the participants were from different nations as some nations are more open than others when it comes to perceiving smart technologies. Finally, not all smart technologies that exist have been included in the research, which could have brought different results.

Recommendations for further research

For further research, it would be interesting to see how different generations perceive technological implementations as younger generations have been dealing with technologies since their childhood, whereas on the other side older generations have not been influenced since their childhood meaning that there could be different results. This research could also be used to see how different types of customers based on other demographic factors (income, education, profession, culture, etc.) perceive smart technologies. Finally, sometimes customers do not know what they want, because they have not experienced the benefits of an invention. As Henry Ford said: “If I had asked people what they wanted, they would have said faster horses.”. Consequently, whenever he consider the topic of innovations and creativity, we must also take into the account that some things must be experienced in order to be understood and valued. Investigations from this angle are also highly recommended, because we feel it we are embarking on an uncharted territory and that overly simplistic answers, too eager to jump into

conclusions, provide very easy, clear and wrong answers to questions touching upon something as profound as is the relationship of human beings with technology.

References

Amer, M., & Alqhtani, A. (2019). IoT applications in Smart Hotels. *International Journal of Internet of Things and Web Services*, *6*.

Bilgihan, A., Smith, S., Ricci, P., & Bujisic, M. (2016). Hotel guest preferences of in-room technology amenities. *Journal of Hospitality and Tourism Technology*, *7*(2), 118-134. doi:http://dx.doi.org.ezproxy.rit.edu/10.1108/JHTT-02-2016-0008

Buhalis, D., & Moldavska, I. (2021). In-room Voice-Based AI Digital Assistants Transforming On-Site Hotel Services and Guests' Experiences. In *Information and Communication Technologies in Tourism 2021* (pp. 30-44). Springer, Cham.

Franušić, K. (2015). The Kano Model: Must-be vs. Attractive Requirements. *RIT Croatia Digital repository - Rochester Institute of Technology.* Retrieved from: https://urn.nsk.hr/urn:nbn:hr:229:325888

Gretzel, U., Reino, S., Kopera, S., & Koo, C. (2015). Smart tourism challenges. *Journal of Tourism*, *16*(1), 41-47.

Forget the Front Desk: Norwegian Comfort Xpress Opens with Automated Check-ins. (2011, January 13). Hospitality Technology. https://hospitalitytech.com/forget-front-desk-norwegian-comfort-xpress-opens-automated-check-ins

Jaremen, Daria E. & Jędrasiak, Małgorzata & Rapacz, Andrzej. (2016). The Concept of Smart Hotels as an Innovation on the Hospitality Industry Market – Case Study of Puro Hotel in Wrocław. Ekonomiczne Problemy Turystyki. 36. 65-75. 10.18276/ept.2016.4.36-06.

Kano, N., Nobuhiku S., Fumio T., & Shinichi T. (1984). Attractive quality and must-be quality. Journal of the Japanese Society for Quality Control, 14 (2), 39–48. ISSN 0386- 8230

Kim, J. J., Montes, A. A., & Han, H. (2021). The Role of Expected Benefits towards Smart Hotels in Shaping Customer Behavior: Comparison by Age and Gender. *Sustainability*, *13*(4), 1698. MDPI AG. Retrieved from http://dx.doi.org/10.3390/su13041698

Leung, R. (2019). Smart hospitality: Taiwan hotel stakeholder perspectives. *Tourism Review of AIEST - International Association of Scientific Experts in Tourism*, *75*(1), 50-62. doi:http://dx.doi.org.ezproxy.rit.edu/10.1108/TR-09-2017-0149

Mercan, S., Cain, L., Akkaya, K., Cebe, M., Uluagac, S., Alonso, M., & Cobanoglu, C. (2020). Improving the service industry with hyper-connectivity: IoT in hospitality. *International Journal of Contemporary Hospitality Management*, *32*(1), 243-262. doi:http://dx.doi.org.ezproxy.rit.edu/10.1108/IJCHM-06-2020-0621

Miočić, B. K., Korona, L. Z., & Matešić, M. (2012, May). Adoption of smart technology in Croatian hotels. In *2012 Proceedings of the 35th International Convention MIPRO* (pp. 1440-1445). IEEE.

Nguyen, T. P. T. (2020). Millennial travellers' expectations for smart hotels.

Peng, W., & Zhang, M. (2020). Is Personalized Service No Longer Important? Guests of Smart Hotels May Have Other Preferences. *Journal of Service Science and Management*, *13*(03), 535.

Petrevska, B., Cingoski, V., & Gelev, S. (2016). From smart rooms to smart hotels. *Zbornik radova sa XXI međunarodnog naučno-stručnog skupa Informacione tehnologije-sadašnjost i budućnost, Žabljak. 29 feb 05 mar 2016*, *21*, 201-204.

Praničević, D. G., & Mandić, A. (2020). ICTs in the hospitality industry: An importance-performance analysis among small family-owned hotels. *Tourism (13327461)*, *68*(2).

Sánchez López, T., Ranasinghe, D.C., Harrison, M. *et al.* Adding sense to the Internet of Things. *Pers Ubiquit Comput* 16, 291–308 (2012). https://doi-org.ezproxy.rit.edu/10.1007/s00779-011-0399-8

Stankov, U., Filimonau, V., & Slivar, I. (2019). Calm ICT design in hotels: a critical review of applications and implications. *International Journal of Hospitality Management*, *82*, 298-307.