

## Prospects and Challenges of Technology for the Hospitality Industry

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**Abstract.** The Hospitality Industry has excelled long path with a set trend for customer experience and its highest level of satisfaction however, incorporating and adopting new technologies has not been on the top of the list. Undoubtedly, this industry is one of the major driving forces of the global economy. Our daily lives are being altered with the advancements in technology and without judging for the better or worse, technology is influencing the Hospitality industry too to adapt to survive. This widespread state of welcoming the new technologies in the industry in the recent past has crafted a new pathway in which services are provided and received. The International Hotel and Restaurant Association (IH&RA) also examined the need for technology in the hospitality industry and it is reflected that the future will be the one that to meet customer's needs on the customer's terms, technology will be the most effective solution. This paper will try to explore what is the state of art technologies currently being employed and how effectively they are facilitating to improve the guest experiences and changing the hospitality service platform. Further with the tremendous growth of the internet of things technology (IoT), to envision some potential future hospitality services and at the same time to discuss some fundamental challenges that need to be overcome to initiate long-lasting future proof solution for this hospitality industry.

**Keywords:** Technophile; Hospitality Service Providers (HSP); Internet of Things (IoT); Touchpoints; Back of the House (BoH); Point of sale terminals (POS); Property management system (PMS)

### 1 Introduction

In the pre-pandemic situation, there has been a steady growth in the domestic and international tourism sectors and as a result, the revenue generated from accommodation, food and beverage and the other services provided to the tourists and business travelers has made this hospitality industry a key driver to the global economy. To keep this growth steadily upward, the industry experts and leaders always argue for major improvements in the quality of services to be provided to adapt to the changing customer

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travel behaviors, especially in the post-pandemic. These improvements are very much required because our targeted customer is new generation individuals who are technophile traveling on the right budget. The implementation of the improvements leads to a complete makeover of the service packages and the underlying technological framework which is presently used by the Hospitality Service Providers (HSP). The basic vision is to provide more personalization of experiences and digitalization of services.

In and around the 2000s, the document says that there were approximately one billion computer users and many of them were wealthy enough to have a computer at home or they had to use the computer at workplaces. Rather, only a few of the guests were technologically advanced to use the computer during their stay. Today the scenario has changed as most of the guests are very much techno-savvy.

This is the age of technology and it is imperative to turn towards digitalization of services to attract the technophile guest. So, the ultimate goal of this digitalization is to develop a digital business model by pursuing hospitality services to guests' touchpoints. Such a digital service platform will make the guest able to browse, plan and pick activities at their convenience which will facilitate seamless integration of technology into their travel experiences. Starting from booking and reservation services, personalized communication, local-based service, and social media integration are a few examples of digitalized services that attract guests. The guest can always be encouraged to use in-house applications by providing special incentives such as loyalty points, coupons, and bonuses.

The future of the hospitality industry is all about the guest experience is based on how good your technology is due to the boom in the Internet of things technology (IoT). What is IoT? It is the interconnection of many physical devices used in everyday life such as sensors, actuators, identification tags, mobile devices, and many more so that guests can easily communicate directly or indirectly by using local communication network channels or via the internet. The incorporation of IoT technology will make the hotel a smart hotel and surely it will open up the avenues to provide immediate, personalized, and localized services which the HSP can apprehend the guest behaviors and preferences and likes and disliking much before with higher accuracy. The implementation of IoT will increase the efficiency level of the back end multiple departments such as front office, housekeeping, sales and marketing, etc. which is cost saving as well as smart energy-saving too. One can see the effective presence of IoT technology in this industry with an introduction to public terminals, in-room technologies, and mobile applications and some highly rated applications such as body area sensor networks, environment monitoring, and various augmented reality experience will surely escort the new business prospect to the next level.

Due to the advancement of science, technology is also advancing at a faster pace and as a result, the expectations of patrons as well as how the hospitality industry will conduct its business to meet those expectations are changing with time. Therefore, all the HSP must aim at such a future-proof technology framework so that it can be enhanced and upgraded with the changing landscape of IoT technology.

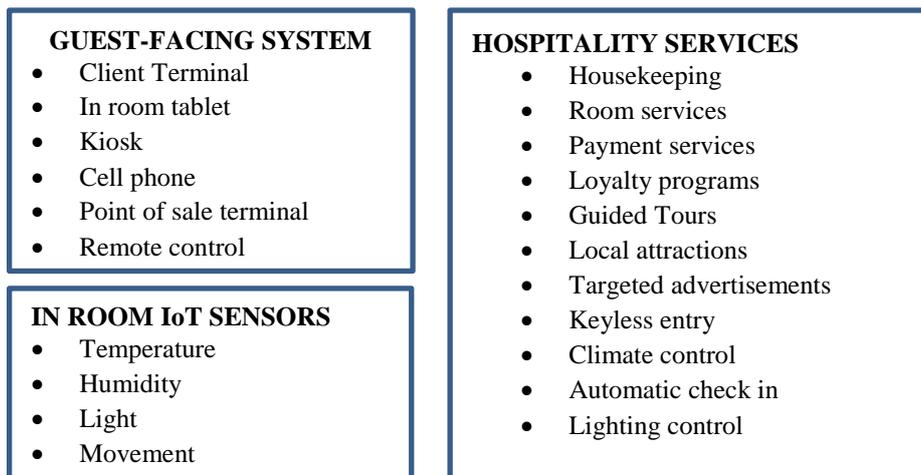
The scope of this review article is to present an overview of the role of technology in the state of art hospitality services. Also, it will be part of the discussion here that the revolution of technology following the potential future of the hospitality industry. This

paper will also give the effort to outline the challenges the HSP is facing currently and the need to overcome them for a future-proof solution.

## 2 State of Art Hospitality Services

With the advancement of technology, all the HSP of different categories of business models such as midscale, upscale, and luxury hotels are making a large expenditure to revamp the technological infrastructure base on digitalization of the service platform for the benefit of both the guest and the service providers. This reform of technology is focused on innovation in smart devices and IoT. Guest can interact on screen and online through various guest-facing systems which are very convenient for the guest as well as service providers to collect valuable data and feedback. The digitalization in the back of the house (BoH) management systems has increased the efficiency level, enhanced the managerial effectiveness, helped in reducing the cost of goods sold and also there is marked improvement in revenue generation and thus sustainability has improved.

Fig. 1. State of Art Hospitality Services



The different guest-facing system in a digitalized service platform in the hospitality industry includes point of sale terminals (POS), Mobile applications, different handheld devices like kiosks, client terminals, In-room tablets, remote, etc. should be integrated into the system so seamlessly in all the phases of the guest cycle such as pre-sale, point of sale and post-sale phases so that guest will experience a complete zero error digital services. The introduction of various guest-facing systems will ensure guest satisfaction by allowing guests to control the environment. It empowers the guests with services like automatic check-in and checks out, keyless entry, control of in-room functions, etc.

Many hotels allow the guests to do automatic check-in and keyless entry by using their mobile apps. There are different mobile apps with the added features to allow guests to have control of in-room IoT products. Hotels are also developing proprietary in-room tablets that facilitate the guests to order for room service, message the concierge, arrange for transportation, making free voice over internet protocol (VOIP) calls, and also choose the TV stations, movies which are on stream onto the hotel television.

Location-based services provided through a guest-facing system are another area that is linked to guest satisfaction. This technology enables on-property or off-property services like guided tours, recommendations about local events, and also suggestions for dining and entertainment options. This kind of service has two major benefits. It keeps the guest updated with the local areas and what's happening around and it enables the HSP to keep the guests within the revenue loop.

Another part of the guest-facing system is BoH management which includes property management system (PMS), Revenue and sales management (RSM), Customer relationship management (CRM), Housekeeping maintenance software, etc. For example, in-room IoT setups like thermostats, motion sensors, and ambient light sensors can be used to control light, the temperature in hotel rooms to reduce the cost especially when the rooms are either unoccupied or unsold. Daylight harvesting is another energy-saving scheme used to increase indoor lighting consistency by automatically adjusting LED lights based on natural light detected in the room.

The effectiveness of an innovative guest-facing system is reflected in developing dynamic relations between guests and HSP. This will enable the service providers to monitor the guest cycle very closely and creating a guest profile based on guest preferences, behaviors, and location services by using the BoH system so that it will be easy for the HSP to provide more personalized service offers for the repeat business. This custom profile of the guest can be shared within the large network of partners to offer highly personalized services to the guest.

Another critical area is to develop the brand value of HSP by effective use of social media platforms and connecting guests to rate and review services through online portals. The modern-day technophile guests take their decisions on online reviews when planning to purchase hospitality services. The risk factor is, even only one negative review can have a greater impact to get a potential loss. Therefore, it is very important for BoH management to monitor the online reviews and take immediate action to mitigate their effects.

The technology-based BoH management system can provide improved revenue per available room (RevPAR) by making the housekeeping and maintenance services faster with the help of in-room technologies and guest preference profiles which will ultimately reduce the downtime of the hotel rooms, optimum utilization of labor resources, and ultimately improving the guest satisfaction significantly. BoH can also take the help of in-room and on-property smart systems to discover the faults and failures thus reduce the real-time and thus leads to prompt maintenance.

### **3 Scope of future hospitality services**

The basic mantra of the Hospitality business is all about improving the experience of customers (guests) and the success of the business depends on how visually and physically it appeals to guests. The technological advancement with its innovations and novelties are the engines of development especially in the field of manufacturing and Information and Communication Technology (ICT). Hospitality industry services are based on cooperation between a wide range of products and services and so the advantages of the technological revolution are very much obvious. It is quite visible that the development and impact of IoT in different steps of everyday life. It is very much expected that in the future these IoT devices will analyze the data automatically and provides us services. In this sector, we will focus on the potential of the IoT ecosystem in the hospitality business.

The scope of future hospitality services can be categorically represented as under:

#### **3.1 Body area sensors**

Due to the huge development of IoT wearable devices there is a revolution of services. Devices like smartphones, smartwatches, the introduction of smart clothing and smart shoes, etc. can gather user data like body temperature, heart rate, location, fitness activities, etc. Further wireless medical sensor technology has a huge scope of data collection in respect to details about different body organs and systems. The proper analysis of all these varied data can bring immense scope to HSP to offer a host of new services to the customers for a new experience. Starting from the adjustment of in-room temperature as per the requirement of the guest to adjustment of in-room lighting based on the sleep cycle of the guest. Even based on the desired fitness goal and guidelines of the guest, different health meals can also be provided by the HSP. The special medical devices may also be provided to a guest as special facilities such as providing carbohydrate-free diet or surgery meal options, low cholesterol meal options, etc. Voice search is another technology of IoT which is the trend within the hospitality industry to search for hotels, restaurants, and cafes, etc. The demand for voice control is also growing demand. This allows for control of various in-room devices and is also used for automated order taking in restaurants and cafes so that customers will no longer need to wait for someone to come to take their orders.

#### **3.2 Energy Management**

With the introduction of several IoT technology-enabled cost-saving measures, on-property green operations can be implemented. Already there are some energy-saving systems in place which include smart lighting and temperature control devices as well as low power energy-saving compact fluorescent bulbs, LED lights, etc. The energy-saving system can be further extended with the support of IoT-based technology such as IoT-enabled smart devices can alert both the housekeeping and maintenance department if any outlet or area is crossing the limit of power consumption in a given period.

It will surely facilitate the service personnel to find out the root cause of such issue, whether it is happening due to negligence of the guest or due to some other technical faults. The IoT technology can also be utilized to control water consumption by incorporating smart bathrooms installed with smart showerheads, smart sinks, flow control toilets, etc.

### **3.3 Augmented Reality and Beacon Technology**

In today's competitive world, hotels are not just a place to spend the night, it is beyond that. It is to provide a rich hospitality experience to a guest that improves everyday life. Thus hospitality industry is an ideal place to implement the augmented reality (AR) and Beacon Technology to increase upsells and marketing objectives. Through augmented reality, the real physical world can be enhanced version and is achieved through the use of digital visual elements, sound, or other sensory stimuli.

If augmented reality is termed as pull technology, Beacon is all about pushing messages and information based on the location of the guest. The hotels can send marketing messages and information in strategic locations such as information about special drinks when the guest is returning from sightseeing.

Globally the HSP is very much in the process of incorporating AR and Beacon technology into their on-property systems and utilizing these technologies for digitally guided tours, previews of in-room facilities such as décor, amenities, etc, interactive restaurant and room service menu, instant translation services for any documents, etc.

### **3.4 Building Automation and Monitoring**

Through this technological system both the guests and the HSP will be benefited because it will surely increase the efficiency level of the management. Through this technology, the performance of the various essential components of the building such as heating, ventilation, air conditioning, etc. can be sustained to an error-free level. The basic viewpoints of this centralized building management platform are to increase efficiency and reduce costs with a high degree of safety. Guests can be provided with the luxury of control with help of smart apps and voice assistants for their rooms. The introduction of a centralized property management system will facilitate the management to monitor the occupancy, safety, and security, controlling all electrical assets and devices from a single point only. Various energy wastage possibilities from ACs in the room, lighting in the hotel aisles, bathrooms, and many more can be eliminated by installing energy optimization sensors. With help of smart apps-based control setting of DND, or requesting Housekeeping or Laundry can be another unique way of extending the smart experience to the customers. Through this smart app, the guest can review the menu, and come to know about many hotel features. These apps can be developed by using the progressive web version so that guests do not require to download anything however they can access it through the link provided in their email via mobile browser. The IoT-enabled in-room services and on-property guest-facing systems will guide the management for all kinds of preventive maintenance much before any malfunctions are detected during physical inspections.

## 4 Challenges

In the present era of technological advancement and the explosion digital way of life, the hospitality industry is also transforming into a 100 % digital technology-enabled industry. On the way of becoming digitalized, online, mobile, cloud, IoT, Artificial Intelligence(AI), Block chain technology is becoming the most common platform for providing services to the customers(guests) and all these technologies is making their way in the entire aspects of hotel operation, guest services and communications, revenue management, distribution, Customer Relationship Management (CRM) and marketing, etc. These fast innovation in technology and their implementation for the best possible way is very much converging and also changed the landscape of challenges related to technology.

In this section, my effort will be to identify the major challenges associated with the effective technology-enabled hospitality industry. It is of paramount importance to address these challenges by the HSP to sustain steady growth.

In the total operational process of hotels, there are various teams like Revenue Management (RM), Sales and Marketing (S&M), multiple guest service teams such as Housekeeping, Engineering, Front Desk operate in isolation with their technology, database without having proper communication with other teams.

To become technology-driven, there are major impediments in existence as discussed below:

### 4.1 Reluctance to invest in digital technology

Due to lack of understanding of the need of the technology for the modern-day customers who demand a hotel technological experience which is supposed to be better than their daily life at home and that may arise the reluctance to invest. In the present day, the hospitality technological services are much beyond the flat-screen TV or the use of PMS. It is about in-room IoT sensors, guest-facing digital technology, application, and devices like streaming media hubs, voice assistants, messaging capabilities, and many more which we have already discussed in this article.

Moreover many HSP are developing their property solution for providing a new digital experience to the guests as per their metrics and methodologies to meet the demand. This kind of implementation is very effective in the case of a single property but this system may lack in potential when it is extended to an intra- organization or inter-organization as well. This situation can lead to a potential revenue loss for the HSP as they will be unable to provide personalized services to the guests.

### 4.2 Data fragmentation and management

This is another big challenge to the HSP. Due to the implementation of the digital environment, multiple data islands will be created through PMS, CRM, Common reporting standard (CRS), Social media, Web analysis, Marketing Data, and also through various touchpoints. Summarizing multiple data into one and analyzing them is an integral part of the hospitality service. With time the volume of all these data will grow

exponentially and to provide more personalized services to the guest, the BoH management must conduct a very careful analysis of such enormous data to create a very distinct and elaborate profile of each guest about their likings, disliking and many other preferences. Any negligence in this process will surely affect the potential loss of revenue of the hotels. Only specialized technological infrastructures can tackle this considerable computational burden on the BoH management system.

#### **4.3 Security and Privacy**

Concerning data fragmentation and management, there is another big challenge is emerging that is safety, security, and privacy of the collected data about the guests. It is mandatory on the part of HSP to ensure that the information about preferences, behavior, and location of the guests must be used and stored very carefully to protect the guests from physical, economical, and societal threats. Various IoT devices like virtual assistants and mobile key solutions, point of sales are the most prized target of cyber-criminals. All HSP must ensure that any kind of digital interactions with guests must be stored as private and secured by employing robust security measures to prevent data leakages and theft. This problem can be addressed once all three stakeholders such as the guest, developers, and hotels all are their share of responsibilities to prevent such cybercrimes.

The customers(guests) must prevent themselves to share all the information about their tour & travel and stay by showing the tickets on social media where the barcodes and QR codes which often contain significantly more personal information get exposed in the public domain and become an easy hunting ground for the crooks. The hotels also play a bigger role in preventing such crimes. Every HSP must develop a very strong IT infrastructure which is, unfortunately, missing in many cases. They must ensure that servers are hardened, applications are patched, and devices are updated, strong password policies are enforced, and so on. The responsibilities of the developers are an ongoing process by keeping a strict vigil on the applications and updating it from time to time for better security. Only secured network protocol can prevent hackers and minimizes the risks.

#### **4.4 Responsiveness**

The effectiveness of a fully digitalized system in the hospitality industry is largely depending on the prompt acknowledgment of the guest requests and quick delivery of services of the HSP. The interaction between guests and HSP can be pushed to guest-facing systems and implementing it in no time through IoT sensors or devices can easily eliminate the requirement of human element and intervention when dealing with the guest. There is little room for miscommunication and systems can readily reciprocate the guests with required services against requests raised. The responsiveness is also very important for the upkeep and maintenance of the hotels. Any slow response in this regard will lead to a lower the RevPAR of the hotel. So it is again depending on the skill and capacity of the BoH management in analyzing the data collected through various IoT and take immediate action to eliminate the faults.

#### 4.5 Human relationship

There is little doubt that technology always adds value, creates amenities, personalizes the stay however there should be a harmonious relationship and well-balanced mix between the hospitality industry and technology. The other side of the coin reflects that there is a possibility that technology will overtake the human relationship or may destroy what guests are always looking for and appreciating. So, this is another challenge to HSP to create an optimal mix of digital and human interactions to create personalized guest experiences while respecting their privacy.

### 5 Conclusion

As the science blessed technology is advancing at a jet speed, the expectation of the patrons are also changing and automatically to meet those needs of the customers, it is high time for the hospitality industry to embrace the technology for sustaining the growth. To meet such needs in this cut-throat competitive market, the developers must plan their buildings, infrastructure, management structure, and as well as staffing requirements.

The digitalized system does not mean that the experience of the customers only through online and IoT devices, self-check ins and online feedback. All these should be part of such a dynamic system so that the marketing and operational team must provide the highest priority to the customers' experiences. Whenever the customers are dropping any feedback during the stay or during the check-out time about their satisfactions or dissatisfactions, the BoH management must ensure that the right person follows up by communicating with the customers and solving the problem.

In the scope of this comprehensive review of papers, I have discussed and envision some potential future hospitality services and at the same time discussed some fundamental challenges that need to be overcome to initiate long-lasting future-proof solutions for this hospitality industry.

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