

Digital Technology Trends in the Hospitality Industry: Application on Bangladesh Perspective

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Abstract

Digital technology advancements are causing revolutionary changes in the worldwide hospitality industry. The Internet of Things (IoT), blockchain, biometric systems, voice search and control, artificial intelligence (AI), machine learning (ML), and other emerging innovations are changing how people engage with businesses, improving customer service, and increasing operational productivity. With a focus on their function as revenue generators in many other developed countries that have already been implemented, this study analyzes the implementation and impacts of these technologies from Bangladesh's perspective. In this paper, we tried to focus on the latest trends in technologies that are implemented in Bangladesh's tourism and hospitality sector and will soon be adopted in this sector. In order to address the growing demand for digitalization while preserving individualized customer experiences, hospitality businesses in Bangladesh are utilizing innovations such as cloud computing, contactless solutions, robots, and Augmented and Virtual Reality (AR/VR).

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I. Introduction

New technological advancement in the field of computer science and engineering has led us to major paradigm shifts that we wouldn't even have considered one decade ago. With the ever-growing demand for digitalization, technology trends in the hospitality industry are changing rapidly. This trend of technology change is now increasingly recognized as a revenue driver in this industry. The four major segments of the hospitality industry: food and beverage, recreation, travel, and lodging are now leveraging Internet of Things (IoT) solutions and Artificial Intelligence (AI), as well as Augmented Reality (AR) and Virtual Reality (VR). According to the survey by "Hospitality Technology" web magazine [1] in 2023, 69 % of respondents plan to increase tech budgets to meet their upcoming challenges. The impact of their effort has been seen clearly in the current survey 2024. Nowadays, AI-based technologies are creating opportunities to empower the hospitality industry. Another survey result of "Hospitality Technology" web magazine in 2024 [2] has reported that large fast-food giants such as McDonald's, Chick-fil-A, Wendy's, and Taco Bell have adopted AI to improve customer satisfaction in QSRs (Quick-service restaurants), from reducing wait times to ensuring the best items are always on the menu. In the lodging sector, 71% of respondents have agreed that guests perceive guest-facing technologies as empowering [3]. In 2024 Sawon et al., focused on AI in Bangladesh's tourism and hospitality sector, examining its benefits, challenges, and recommendations for integrating AI with human interaction to improve services, data security, and marketing [19]. Bhuiyan et al., in 2024 explored how Bangladeshi consumers' attitudes toward AI in hospitality services are influenced by factors such as social influence, hedonic motivation, anthropomorphism, and emotions, providing valuable insights for industry stakeholders [20]. In 2021, Avi et al. investigated the early adoption of innovative technologies in Bangladesh's tourism and hospitality sector, uncovering challenges such as limited management support, inadequate government backing, and technical barriers, while providing strategic recommendations to drive progress and innovation [21]. Bappy et al., in 2021 examined the transformative impact of innovative technology on Bangladesh's tourism and hospitality sector, shedding light on adoption levels, COVID-19 challenges, and strategic solutions to foster growth and competitiveness [22]. In 2021, Borges et al., explored the global integration of AI into organizational strategy, unveiling its benefits, challenges, and opportunities while introducing a compelling framework for value creation through decision support, engagement, automation, and innovation [23].

From these scenarios, it has been seen that the current IT technology trends continue to reshape how customers service providing ways (i.e., book, order, travel, dine, etc.) in this industry. This article provides an overview of the current digital technology trends in the hospitality industry. We have also explored the opportunities and the required IT technology trends in the context of Bangladesh to empower the hospitality industry here.

The outline of this paper is as follows, the introduction highlights recent trends in the tourism and hospitality sector, along with related works of past and present technological advancements within the context of Bangladesh. In the next section, we have discussed the key digital technology trends driving innovation in the hospitality industry, highlighting their significance and potential applications in this sector. In the later sections, we focused on how the hospitality industry is embracing digital technologies to transform user interactions, streamline services, and boost overall efficiency.

Latest leading hospitality technology trends

There is a big list of ways that the latest technology is being used in the hospitality industry. So, in this section, we have only discussed some of the selected digital technology trends. We have chosen the most interesting and relevant digital technology trends empowering this industry. Moreover, we have tried to emphasize the selected digital technologies, which have been recognized as revenue drivers worldwide. The leading hospitality technology trends are the following [1-7]:

- Voice Search, Voice Control and Speech Synthesizer
- Contactless Solution i.e., Payments, Room Service etc.
- Artificial Intelligence (AI) and Machine Learning (ML)
- Cloud computing
- Internet of Things (IoT)
- Augmented Reality (AR) and Virtual Reality (VR)
- Robotics and Automation In Hotels and Restaurants
- Cybersecurity
- Blockchain Technology
- Biometrics i.e. Face Recognition, fingerprint scans etc.

Voice Search, Voice Control, and Speech Synthesizer

The theme of a Natural interface for both literate and illiterate users for Human-Machine interaction is desirable for all languages. Voice user interface (VUI) is the most natural of these ways. In the lodging sector, hotels or other hospitality settings can offer VUI-based virtual assistant technology i.e., Amazon Alexa, Google Assistant, etc., which can be used to find information and control different devices i.e., control lighting, temperature, and other features. By enabling speedier, round-the-clock service, improving user experience, and freeing employees to concentrate on high-priority work, this technology gives these businesses an advantage in satisfying existing customer needs.

In the Bangladesh hospitality industry, Voice Search, Voice Control, and Speech Synthesizer are used in numerous ways. Chatbots and virtual assistants are examples of Voice Search, Voice Control, and Speech Synthesizer that are changing how customers are served in sectors like travel and hospitality. These AI-powered chatbots and virtual assistants offer 24/7 support, while Alexa and Google Assistant simplify room temperature control, music selection, and room service ordering for guests which enhances the guest experience in Bangladesh [20-21]. By automating frequently asked questions, helping with reservations, and providing individualized support, companies like US-Bangla Airlines, Go Zayaan, and The Westin Dhaka are utilizing these tools to enhance client engagement [24-25]. Bangladesh ICT division has taken various steps in this particular field and developed. The ICT Division of Bangladesh has implemented modern instruments, particularly Bangla STT (Speech to Text) and TTS (Text to Speech) technology, to improve Bengali language usability in the world of technology.[ref.] These tools greatly improve communication, accessibility, and education by enabling the automatic conversion of Bengali voice into written text and vice versa. For people who might have trouble typing, Bangla STT makes digital documentation and communication easier by enabling users to convert spoken Bengali into text. Bangla TTS, on the other hand, translates text into a natural-sounding voice, making it useful for both delivering instructional information and as an auditory learning tool for users who are blind or visually handicapped. Similar to Alexa and other voice assistant technologies, Bangla TTS facilitates voice-driven interactions but targets customers who speak Bengali, providing more linguistically and culturally appropriate assistance. Although Alexa can speak other languages, Bangla TTS is especially

helpful not only in the hospitality sector but also in other sectors like healthcare, and educational sectors since it can give native speakers precise, context-aware responses.

Contactless Solution

Today's hospitality industry is embracing safety and loyalty through the contactless solution. Hotels can enhance their billing system through contactless payment, i.e., NFC¹--enabled debit/credit cards, mobile phones, and other devices, to ensure a safe and secure mode of payment for customers. Other Contactless Solutions (i.e., automated check-in and checkout, room service, and bookings) were introduced by the COVID-19 era. Nowadays, these solutions have become the standard practice for the hospitality industry.

To improve guest experience and security, numerous hotels in Bangladesh have implemented NFC (Near Field Communication) card technology for safe and easy room entry. Prominent hotels that use NFC key cards include The Westin Dhaka, Radisson Blu Dhaka Water Garden, and Pan Pacific Sonargaon Dhaka. In addition to providing further protection, because they may be remotely disabled if misplaced, these NFC-enabled cards enable visitors to unlock their rooms with a single tap, doing away with the need for conventional keys. As a way to ensure that visitors have simple, safe, and seamless access during their stay, this technology also interfaces with additional hotel services including elevators and private spaces. By enabling immediate, contactless payments with a single tap, NFC technology helps bKash and other mobile banking services like Nagad, Rocket, and Upay simplify hospitality administration. By doing away with the need to handle cash or swipe cards, these services expedite checkouts and lower error rates. Additionally, by using mobile devices to securely execute in-house purchases, bill settlements, and hotel upgrades, they improve guest convenience.

Artificial Intelligence (AI) and Machine Learning (ML)

As the accessibility of advanced AI and ML technologies to the general public has become more ubiquitous, it is obvious to see an increased demand for this from customers in everything from events to hotel stays in the hospitality industry. Most current technologies are partially or fully powered by AI or ML. Here, we have explored some of the hospitality industry's top AI/ML-based tech trends.

The *Recommender system*, which is powered by AI and ML, makes the machine capable of personalizing stakeholder interactions. According to the survey by "Hospitality Technology" web magazine [1] in 2023, with AI and ML-powered technology, 74% of businesses increased because of a proper understanding of the needs of their customer.

Big Data Analytics is the cornerstone of customer need analysis. This technology also helps enterprises to discover hidden insights and predict future trends to make better managerial decisions. In the hospitality industry, Big data refers to huge amounts of archived data of customers' preferences, i.e., bookings, reviews, feedback in social media, sharing photos, purchase history, service preferences, search inquiries etc., and customers' metadata, i.e., location, browser, device, session data, referral source etc.

AI-powered *Chatbots* can understand user questions and automate responses to them. An excellent example of a digital concierge delivering customer service using Chatbot in the hospitality industry is Rose [8]. Through the Chatbot, the customer gets several services, i.e., room service, food recommendations, etc. in "The Cosmopolitan" hotel in Las Vegas.

Recommendation engines are used by platforms such as Shohoz, Go Zayaan, and Biman Bangladesh Airlines to customize user experiences by making recommendations for services, lodging, and travel options based on past usage patterns and data insights [24] [26]. These businesses may optimize revenue while offering competitive pricing by using dynamic pricing, another machine learning application, which allows them to modify rates in real-time depending on demand, seasonality, and customer behavior patterns.

Cloud Computing

Cloud computing service allows us on-demand access to computing resources, i.e., servers, data storage, etc., in safe and secure ways. In the hospitality industry, this technology offers preventive maintenance strategies for property, inventory, and hotel management tools. This technology provides robust data safety. One the popular cloud-based Commercial off-the-shelf (COTS) software in the hospitality industry is Hotel or Hospitality Property Management System (PMS). Some of the cloud-based COTS systems are Altexsoft, Oracle OPERA Cloud, RMS Cloud PMS, Hotelogix, BOTSHOT Cloud PMS etc. Usually a PMS system provides following modules –

¹ Near-field communication (NFC) is a short-range wireless technology

- Reservation (i.e., Room bookings, E-payments processing, Reservation emails, etc.),
- Front-desk operations and room management (i.e., Room status, Keys management, etc.)
- Channel management
- Revenue management
- Housekeeping
- CRM and customer data management
- Back-office management

Cloud computing's ability to streamline processes, improve customer experiences, and increase data accessibility is changing hospitality management in Bangladesh. Cloud-based property management systems (PMS) and customer relationship management (CRM) solutions have been adopted by hotels and hospitality brands such as The Westin Dhaka and Amari Dhaka to manage reservations, simplify check-in/check-out procedures, and customize guest services. For example, hotel employees may easily manage guest preferences, track room availability, and access real-time booking information from any device with cloud-based PMS. This technology gives visitors a seamless and customized experience while increasing operational efficiency and lowering dependency on on-premises IT infrastructure. According to reports, cloud use has increased in the hospitality industry due to the requirement for flexibility and accessibility, particularly when managing remote operations [24]. As cloud computing advances, its applications in the Bangladeshi hotel industry are expected to grow, updating and improving service delivery.

Internet of Things (IoT)

Internet of Things (IoT) technology gives us the opportunity to make environment Ambient Intelligence (AmI)² through the connectivity of several electronic and electro-mechanical devices i.e., Bluetooth, RFID, Microchip implant, Sensors, etc. From computing in the AmI environment, the term Ubiquitous computing (UC) emerged. *Ubiquitous computing is a term that refers to the omnipresence of computing in daily lives, in which devices provide connection everywhere and transparently to users* [9].

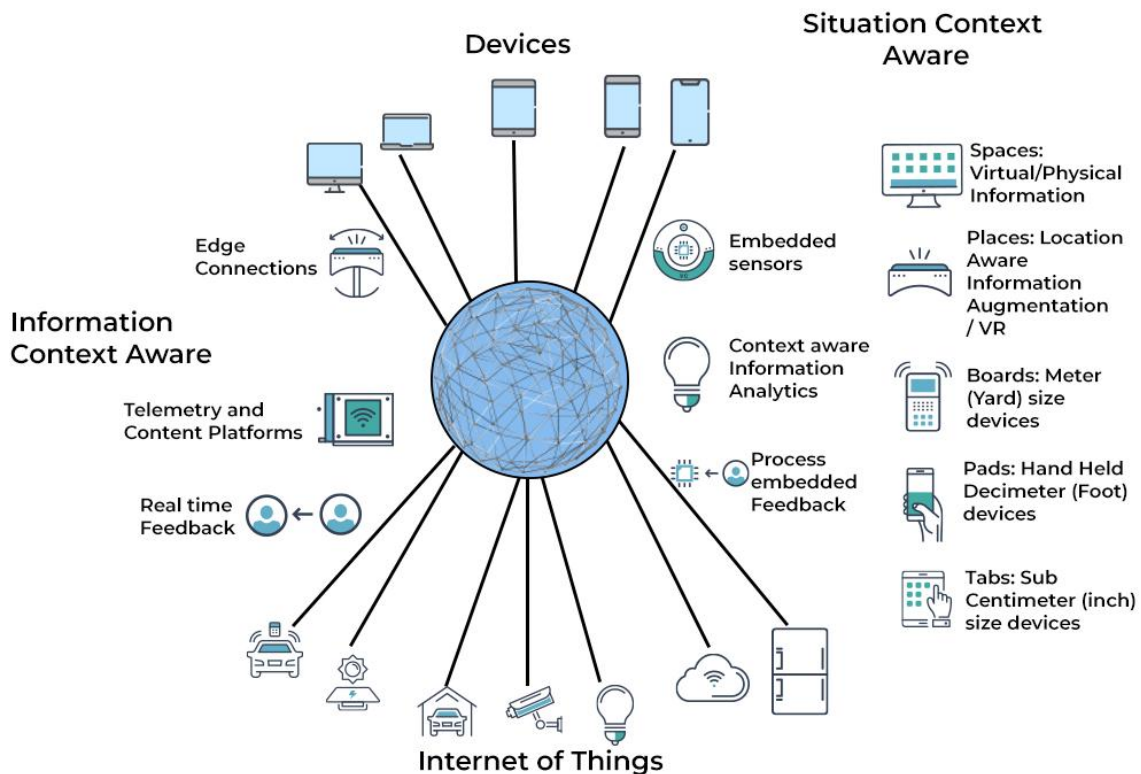


Fig 1: How Ubiquitous Computing Works [11]

Nowadays, IoT is an essential technology for all types of industries. Through IoT, the hospitality industry can offer personalized services, better customer experience, and data-driven decisions to customers

²Ambient intelligence (AmI) - refers to electronic environments that are sensitive to the presence of people. [10]

with AmI environments—for example, personalized services such as controlling room temperature, lighting, etc. in a hotel room. The hospitality industry can also improve other key factors like Safety and Security, energy efficiency, and sustainability through IoT technology.

Although there aren't many specific hotel examples, Bangladesh's hospitality industry is gradually embracing IoT technologies. For improved guest services and energy management, the Westin Dhaka and Radisson Blu Dhaka Water Garden are implementing smart technology like Internet of Things-enabled systems. By enabling automated temperature controls, lighting, and service requests through smart devices, these systems improve productivity and the visitor experience.

Furthermore, local initiatives are establishing the foundation for the deployment of IoT. Companies such as Bondstein Technologies, for example, are strongly supporting IoT integration in a variety of industries, including hospitality, by offering business-to-business (B2B) solutions for linked equipment and remote monitoring. These developments show that there is increasing interest in using IoT to improve hotel operations in Bangladesh.

Augmented Reality (AR) and Virtual Reality (VR)

Virtual reality (VR) and augmented reality (AR) are two new exciting technologies for changing the way we interact with virtual and physical artifacts. With AR, a user can produce and project virtual artifacts into the physical world to change his or her view of the world [15]. Any smartphone user can use AR through a phone's camera or video viewer. On the other hand, VR is a computer-generated virtual world, where a user can interact with the virtual artifacts in the virtually simulated world [15]. Through immersive simulations, users can build almost any imaginable virtual world using special interactive devices (i.e., computers, sensors, headsets, and gloves). By leveraging VR in the hospitality industry, prospective customers can explore event areas or hotel rooms and facilities virtually through immersive 360-degree tours. In the case of Bleisure Travel (i.e., combined travel of business and leisure), prospective customers can identify and provide their requirements to the service provider for their prospective trips through virtual tours. By leveraging AR, the on-site experiences of prospective customers can be enhanced. Through AR technology, the service provider can provide interactive information, virtual guides, real-time translations, etc. as a helping aid to customers.

Augmented Reality (AR) and Virtual Reality (VR) technologies are being used efficiently in Bangladesh's hospitality and tourism industries, particularly at HazratShahjalal International Airport (HSIA) and by organizations such as the Bangladesh Tourism Board (BTB) and ShareTrip BD. AR and VR applications at HSIA offer immersive virtual tours and interactive information, allowing tourists to navigate the airport and learn about nearby attractions in a more engaging way. Facial recognition enhances check-in efficiency, image recognition uses guest-uploaded photos for popular features, and smart luggage tracking improves airline efficiency [27]. This improves traveler experiences by providing details about airport services and adjacent places. Additionally, expert luggage tracking technologies are being adopted to enable travelers to watch their bags in real-time, considerably reducing the danger of lost luggage and improving overall travel security and efficiency. These innovations not only enhance passenger happiness but also position Bangladesh as a progressive participant in global tourism. [28-30]

Robotics and Automation In Hotels and Restaurants

Global Hospitality Robots Market was valued at USD 376.5 million in 2023 and USD 472.51 million in 2024 and is poised to reach USD 2316.94 million by 2031 at a CAGR of 25.5% during the forecast period (2024-2031) [12]

Brooks's research [13] in 1998 at MIT Artificial Intelligence Lab on humanoid robots raised several research issues. One of the issues is that a robot requires the capability of social interaction. New AI and ML algorithms can lead to significant advances in human-robot interaction. From the above forecasting report, we can easily realize that due to these advancements hospitality robots getting popular [12].

In the lodging sector, robots can assist guests with check-in, check-out, room service, food delivery, and concierge services. As robotics implies the automation of physical activity-related routine tasks, other sectors of the hospitality industry can deploy robots. Other than the service robots for Guest Services and Assistance, robots can be used in cleaning, security, and surveillance tasks to increase operation efficiency and reduce labor costs.

In Bangladesh, robotics is making an impact in the hospitality industry, with robots functioning as waitstaff, cleaners, and even bartenders in particular dining places. The service robots provide room service,

cleaning robots for vacuuming and floor cleaning, and bartender robots for precision and speed which also help in predictive maintenance, personalized marketing, and smart city management, providing a unique and efficient experience for guests [31]. Fuji Train Restaurant and Mexwel Robot Restaurant are two pioneering instances of how robots play an important role in customer service. At Fuji Train Restaurant, robots transport meals to tables via a track system, providing a unique and entertaining dining experience. Similarly, Mexwel Robot Restaurant uses robots to serve clients and assist with orders, increasing operating efficiency while adding a touch of uniqueness. These robots are intended to connect with consumers, streamline service, and provide consistent, efficient experiences while leaving human employees to focus on personalized guest interactions. This use of robotics is part of a growing trend in Bangladesh, where businesses are incorporating automation to improve service quality and customer satisfaction, Dhaka Tribune [32], 15 November, 2017.

Cybersecurity

In the hospitality industry, cybersecurity is one of the key services of concern. Here, all stakeholders' data are valuable. These data are vulnerable to breaches and cyberattacks. According to data from IBM, the global average cost of a data breach is \$4.88 million in 2024 [14]. In 2023, a research report [16] on the hospitality cybersecurity threat showed by Trustwave Inc., a cybersecurity service provider, that 31% of this industry has faced a data breach. Within them, 89% are affected more once in year [16]. So, it is important to provide cybersecurity to help safeguard these businesses from cybercriminals. This industry endeavors to offer a better guest experience, and building and sustaining an impeccable reputation is critical. Ubiquitous Computing-based integrated technologies rely on vast amounts of stakeholders' data to help improve the customer experience, leaving the industry vulnerable to bad actors like criminals or unethical hackers. The large amounts of stakeholders' data mainly contain sensitive data like customer personal information (i.e., name, address, credit cards, etc.), which are attractive to cybercriminals. Cybersecurity plays a big role in protecting consumer data and the revenue and reputation of hospitality-oriented businesses. So, we should always explore and be aware of the updated threats these companies face to help keep the industry and its customers safe from cyberattacks.

As hotels digitize operations and manage customer information, cybersecurity becomes increasingly important in Bangladesh's hospitality industry. The Westin Dhaka and Pan Pacific Sonargaon Dhaka have put in place advanced cybersecurity safeguards to protect sensitive guest information and ensure that they comply with laws governing data protection. To prevent data breaches and cyber threats, these hotels use modern security methods such as encryption, firewalls, and secure payment gateways. Given the global increase in data breaches, many Bangladeshi hotels are investing in robust cybersecurity strategies to protect their guests and maintain trust, reflecting a broader industry trend of prioritizing cybersecurity in an increasingly digital landscape stated in Dhaka Tribune [32], 2022 and The Daily Star [33], 2023 national newspapers.

Blockchain Technology

Blockchain technology is an advanced distributed database mechanism that provides secured information-sharing within a business network [17]. It is getting popular for its use in Bitcoin. This technology has provided several benefits for the hospitality industry. One of the key features is that it enhances data security and stability to improve the customer experience. Financial transactions, bookings, etc., and other hospitality industry-related sensitive transactions are safeguarded and protected from cyber-attacks using this technology. Blockchain can facilitate the hospitality industry in many applications. The four major applications where this technology can play vital roles are [18]-

- I. Secure Payments- Blockchain process payments are very secure by cryptography. Transaction tracking and auditing are easy because of transparent and global records.
- II. Identity Verification - In this industry, one of the important tasks is customer identity verification. Customer should be verified through their ID or Biometrics verifications as proof of their identification in various stages for their traveling. It is easy to manage a secure platform for identity verifications using the blockchain's features of a global ledger and maintaining immutable records (i.e., cannot be tampered with).
- III. Customer Loyalty Scheme- To encourage the customer to make repeat choices of specific services, most service providers in the hospitality industry use "customer loyalty reward schemes" as their marketing strategy. Through the blockchain's features, it is possible to provide a secure and transparent process for customers to access and redeem their reward points.
- IV. Baggage Tracking System- One of the logistical issues in this industry is luggage delivery on time in the hotel room or another event place. To give a better customer experience, the service providers (i.e., Airlines, Hotels, etc.) need to track baggage properly. By leveraging blockchain technology in the hospitality industry,

service providers can provide a transparent and auditable smart baggage tracking system to prevent luggage loss or theft.

Whereas blockchain technology's use in Bangladesh's hospitality sector is still in its early stages, there are promising global and local government initiatives. Furthermore, the government of Bangladesh has been investigating the potential of blockchain technology in several areas, including land registration and public service enhancements. This suggests that the hospitality industry may soon use technology to improve client trust, expedite operational procedures, and lower fraud. Although there are currently no examples of particular hotels in Bangladesh implementing blockchain, the technology's widespread use in the hospitality industry suggests that this trend is only going to get more effective.

Biometrics i.e. Face Recognition, fingerprint scans etc.

The term Biometrics refers to "Biological measurements" that are used to identify a person uniquely. Customer identity verification is a crucial task in the hospitality industry. Biometrics recognition is a prominent technology for person identification using a person's physical and behavioral characteristics. In this industry, customers require biometrics verifications as proof of their identification in various stages for traveling and reporting to their desired place. For example, at hotels or event places, biometrics verification may include fingerprint scans, facial recognition, and voice recognition for contactless check-ins and check-outs.

Biometric technology, such as facial recognition and fingerprint scanning, is increasingly being used in Bangladesh's hospitality industry to improve security and speed up client experiences. Hotels such as The Westin Dhaka use fingerprint recognition for rapid and secure check-ins, allowing guests to avoid traditional procedures. Similarly, Radisson Blu Dhaka Water Garden uses facial recognition systems to manage entry and increase safety. These technologies not only improve operational efficiency but also guest security, showing an industry trend of incorporating modern technology for improved service in Future Startup [24], 2020; Dhaka Tribune [32], 2021.

II. Conclusion

In conclusion, new digital technology trends are rapidly changing the ways of user interaction and service-providing methods in the hospitality industry. In these times, this industry leverages a wide range of integrated digital technologies to enhance customer experience, streamline operations, and improve efficiency and productivity. The upcoming years are poised to usher in exciting advancements in this industry. However, service providers need to strike a balance between the use of technology with increased demand and the personal interactions that customers expect. It is essential for the hospitality industry in Bangladesh to adopt key technologies, with cybersecurity being paramount, to safeguard sensitive customer data, secure transactions, and uphold trust in an increasingly digital world.

References

- [1] Mehmet Erdem, Ph.D., Associate Professor of hotel operations & technology and William F. Harrah, College of Hospitality, University of Nevada, Las Vegas; and Robert Firpo-cappiello, Editor-in-Chief, Hospitality Technology, "2023 Lodging Technology Study: Embracing Mobility & Self-Service", Hospitality Technology, 2023. [Online]. Available: <https://hospitalitytech.com/2023-lodging-tech-study?email-confirmed=1726017401499>, Accessed on: Sep 11, 2024
- [2] David Lance, Solutions Architect and Head of AI Platforms at Bottle Rocket, "AI as a Tool to Boost Customer Satisfaction", Hospitality Technology, 2024.
- [3] Mehmet Erdem, Ph.D., CHTP, CHE (he/him/his), Professor of Hotel Operations & Technology and William F. Harrah, College of Hospitality, University of Nevada, Las Vegas; and Robert Firpo-Cappiello, Editor-in-Chief, Hospitality Technology and the Hotel Technology Forum (HTF), "2024 Lodging Technology Study: Digital Transformation & ROI", Hospitality Technology, 2024.
- [4] "9 Technology Trends You Shouldn't Miss In The Hospitality Industry", IBTM World, Oct 12 2022 [Online]. Available: <https://www.ibtmworld.com/en-gb/blog/tech-and-software/technology-trends-hospitality-industry.html>, Accessed on: Sep 13, 2024
- [5] Davina van Buren, "6 of the latest technology trends in the hospitality industry", Samsung, Published: Jan 10 2024, [Online]. Available: <https://insights.samsung.com/2024/01/10/6-of-the-latest-technology-trends-in-the-hospitality-industry/>, Accessed on: Sep 13, 2024
- [6] PavloZheldak, "Top Hospitality Technology Trends to Embrace in 2024", Acropolium, Aug 13 2024, [Online]. Available: <https://acropolium.com/blog/top-hospitality-technology-trends/>, Accessed on: Sep 13, 2024
- [7] "The Latest Technology Trends In the Hospitality Industry (2023)", AlipioUmiten IV, [Online]. Available: <https://www.revolutionordering.com/blog/technology-trends-in-the-hospitality-industry>, Accessed on: Sep 13, 2024
- [8] "Rose, the Resident Mischief-Maker & Digital Concierge of The Cosmopolitan of Las Vegas." <https://cosmopolitanlasvegas.mgmresorts.com/en/amenities/rose.html>
- [9] Weiser, Mark. "Hot topics-ubiquitous computing." Computer 26.10 (1993): 71-72.

- [10] Ambient intelligence (From Wikipedia, the free encyclopedia). [Online]. Available: [https://en.wikipedia.org/wiki/Ambient_intelligence#:~:text=Ambient%20intelligence%20\(AmI\)%20is%20a,computing%20from%201960%20to%202010](https://en.wikipedia.org/wiki/Ambient_intelligence#:~:text=Ambient%20intelligence%20(AmI)%20is%20a,computing%20from%201960%20to%202010), Accessed on: Sep 13, 2024.
- [11] ChiradeepBasuMallick, "What Is Ubiquitous Computing (Pervasive Computing)? Meaning, Layers, Examples, and Applications", Spiceworks, Jul 11, 2022, [Online]. Available: <https://www.spiceworks.com/tech/iot/articles/what-is-ubiquitous-computing/>, Accessed on: Sep 14, 2024
- [12] "Hospitality Robots Market Size, Share, Growth Analysis, By Type (Service Robots, Security Robots, Cleansing Robots, And Others), By Application (Room Service and Delivery, Cleaning and Maintenance, guest service and assistance, Security and surveillance), By Region - Industry Forecast 2024-2031", SKYQUEST, May, 2024, [Online]. Available: <https://www.skyquestt.com/report/hospitality-robots-market>, Accessed on: Sep 17, 2024
- [13] Brooks, Rodney A., Cynthia Breazeal, Matthew Marjanović, Brian Scassellati, and Matthew M. Williamson. "The Cog project: Building a humanoid robot." In International workshop on computation for metaphors, analogy, and agents, pp. 52-87. Berlin, Heidelberg: Springer Berlin Heidelberg, 1998. Accessed on: Sep 19, 2024.
- [14] "Cost of a Data Breach Report 2024", IBM, 2024, [Online]. Available: <https://www.ibm.com/reports/data-breach>, Accessed on: Sep 16, 2024
- [15] "What's the Difference Between AR and VR?", Tulane School of Professional Advancement, Tulane University, New Orleans, Louisiana, USA. [Online]. Available: <https://edu.gcfglobal.org/en/thenow/understanding-virtual-reality-and-augmented-reality/1/>, Accessed on: Sep 17, 2024
- [16] "2023 Hospitality Sector Threat Landscape: Trustwave Threat Intelligence Briefing and Mitigation Strategies", Trustwave: SpiderLabs, Sep 2023. [Online]. Available: https://www.trustwave.com/hubfs/Web/Library/Documents_pdf/2023_Trustwave_Hospitality_Sector_Threat_Landscape_Executive_Summary_Infographic.pdf, Accessed on: Sep 18, 2024
- [17] "What is blockchain?", IBM. [Online]. Available: <https://www.ibm.com/topics/blockchain>, Accessed on: Sep 17, 2024
- [18] MartijnBarten, "Blockchain Technology within the Hospitality", Revfine – Optimising Revenue, Updated Jun 04, 2024, [Online]. Available: <https://www.revfine.com/blockchain-technology-hospitality-industry/>, Accessed on: Sep 20, 2024
- [19] M. H. Sawon, F.Y.Lina, M.A.Hossain, "AI in the Tourism and Hospitality Industry in Bangladesh: Challenges and Ways Forward". Accessed on: August, 2024
Available: https://www.researchgate.net/publication/383122305_AI_in_the_Tourism_and_Hospitality_Industry_in_Bangladesh_Challenges_and_Ways_Forward
- [20] Bhuiyan, K. H., Ahmed, S., & Jahan, I. (2024). Consumer attitude toward using artificial intelligence (AI) devices in hospitality services. *Journal of Hospitality and Tourism Insights*.
- [21] Avi, M. A. R., Nasrin, M., & Hassan, A. (2021). Application of Innovative Technologies in the Tourism and Hospitality Industry of Bangladesh: The Present Scenario. *Technology Application in the Tourism and Hospitality Industry of Bangladesh*.
- [22] Bappy, T. A., & Avi, M. A. R. (2021). Technological innovation application in the tourism and hospitality industry of Bangladesh. *Technology Application in the Tourism and Hospitality Industry of Bangladesh*.
- [23] Borges, A. F., Laurindo, F. J., Spínola, M. M., Gonçalves, R. F., & Mattos, C. A. (2021). The strategic use of artificial intelligence in the digital era: Systematic literature review and future research directions. *International Journal of Information Management*.
- [24] Future Startup. (2020, January 15). Zayaan: Bangladesh's First AI- powered Digital Travel Assistant That Empowers Bangladeshi Travelers. *Future Startup*. Available: <https://futurestartup.com/2020/01/15/zayaan-bangladeshs-first-ai-powered-digital-travel-assistant-that-empowers-bangladeshi-travelers/>
- [25] US- Bangla Airlines. (2024). US- Bangla Airlines: Book Flights to Bangladesh and Beyond. USBAIR. <https://usbair.com>
- [26] Hasib, K. (2022). Sentiment Analysis on Bangladesh Airlines Review Data using. *Machine Learning*.
- [27] Zhang, K., Chen, Y., & Li, C. (2019). Discovering the tourists' behaviors and perceptions in a tourism destination by analyzing photos' visual content with a computer deep learning model: The case of Beijing. *Tourism Management*.
- [28] HazratShahjalal International Airport (HSIA). (n.d.). HazratShahjalal International Airport (HSIA). <https://www.hsia.gov.bd>
- [29] Kumar Acharjee, S. (2023). An Analysis of the Activities and Performance of Bangladesh Tourism Board (BTB). *South Asian Journal of Social Studies and Economics*, 31–41. 10.9734/sajsse/2023/v17i1628
- [30] ShareTrip. (2024). Get the best deals. ShareTrip. <https://sharetrip.net/promotions/BaggageProtection>
- [31] Khan, M. Y. H., Anika, J. J., & Hassan, A. (2021). Technological Innovations Application in the Tourism Industry of Bangladesh. *Technology Application in the Tourism and Hospitality Industry of Bangladesh*
- [32] Dhaka Tribune, Available: <https://www.dhakatribune.com/>
- [33] The daily star, Available: <https://www.thedailystar.net/>