

2 **Smart technology trends in the tourism and hospitality industry**

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Introduction

The Internet of Things (IoT) offers tourism businesses the opportunity to observe real-time customer experiences and expand their customer base (Buhalis et al., 2019). Using artificial intelligence and robotic technologies in processes, such as sales and customer relations, makes customers feel more special. Tourism companies are differentiating their interactions with the customer with applications such as travel planning and booking with chatbots and artificial intelligence-based destination suggestions (Buhalis et al., 2019). In addition, the use of these technologies in all operational processes that directly or indirectly touch the customer, reduces employee effort, and provides cost optimization. Virtual and augmented reality technologies, which are an imitation of the real world, change the way of promotion and marketing of the service in the tourism sector by making it possible to experience destinations, hotels, restaurants, and similar places to travel without going. Blockchain, which is an advanced record keeping technology at the global level, provides instant access to the data produced in the tourism industry, is used to gather tourist information or to monitor supply and demand in real time. Being aware of these technological trends, which have changed the way of doing in the tourism sector, is important in order not to fall behind (Buhalis & Sinarta, 2019).

IoT applications in tourism industries

The technological infrastructure that connects via Internet-connected sensors, chips, and communication modules, which allows objects to exchange information among themselves, is called the IoT (Chaouchi, 2013; Schönberger

& Cukier, 2013). IoT connects the devices via the internet or cloud service in order to collect and distribute data. This makes the analysis easier, accurate, and in real time, and ensures the management of visitor flows, road traffic, and reduction of traffic accidents. Tourism companies use IoT technologies to reduce operational risks and costs, offer personalized services and continuous communication (e.g., mobile, kiosk, and sensors) with tourists, create new ways of earning, improve staff productivity and customer experience (Buhalis, 2020). IoT technology is used to remotely connect to lights, heaters, and air conditioners in the hotel room, making it possible to control these vehicles from one place.

Virgin Atlantic airline equips its Boeing 787 aircraft and cargo equipment fleet with IoT. This system enables everything from motors to landing gear to be interconnected, to recognize and solve a mechanical problem that may occur, resulting in safer flights and fewer delays. AirAsia uses IoT to reduce fuel consumption by establishing a partnership with General Electric to minimize both its ecological footprint and cost. Flight efficiency service provides very precise navigation data, preventing approximately 20% route loss in the industry and thus optimizing aircraft and fuel use. Delta and Lufthansa airlines use baggage tracking technology enabling passengers to check the location of their luggage at any time (onboard and at the baggage claim until the time of boarding). With the Lufthansa mobile application, passengers can track their baggage through a link on their mobile boarding pass (Drummond, 2016).

In addition to the examples from airline companies, IoT is widely used in the hotels and lodging sector. In City Hub Amsterdam, which is a smart hotel with capsule rooms, the customer can adjust the light of the room to any color with the phone application; it can even receive a light-based wake up. City Hub Amsterdam also uses wearable device technology and smart wristbands. Thanks to the smart wristbands, room entrance is made, and drink glasses can be taken from the self-service bar in the hotel (Skyscanner, 2017). Carnival Cruises and MSC Cruises use IoT and wearable technology. Smart bracelets are used instead of keys or smartphones to enter the rooms. These are called *Ocean Medallion* on the Carnival cruise ships and *MSC for Me* smart bracelet on MSC cruise ships. Payments are made through this wristband connected with a credit card and the route taken can be followed simultaneously. The wristbands record every activity of the customers, transferring the information to the database, enabling family members to locate each other, and accessing the information they want from the television or their smartphones in their rooms. In addition, a typical MSC cruise ship, the *MSC Meraviglia*, has more than 130 smart features, 144 interactive screens,

244 information displays, 31 virtual screens for private ferry cameras, 81 video wall monitors, 2,244 near field communication (NFC) cabin, 3,050 Bluetooth signals, and 1200 closed circuit (CCTV) cameras (Leppert, 2017; Buhalis et al., 2022).

Recognition technology in tourism

Recognition technologies include fingerprint recognition, hand recognition, face recognition, eye retina recognition, voice recognition, body, and motion recognition. Recognition technologies use biometrics, AI technologies, internet connectivity, and IoT. *Biometrics* refers to technologies that measure and analyze individual physical or behavioral features to automate users' authentication process. Physical features include facial patterns, fingerprints, voice, and ocular retinas, while behavioral aspects include writing patterns and body movements. In the tourism sector, fingerprint recognition is used instead of room keys or opening room safes. For instance, Waldorf Towers Hotel in New York is utilizing fingerprint recognition for in-room safes for their presidential suite customers. Disney World theme parks in Orlando have been using two-finger recognition technology since 2005 to increase entry speed and membership passes for individuals over the age of ten (Mills et al., 2010).

Face recognition utilizing video or thermal imaging captures facial features, and analyzes their shapes and patterns (Ryu & Lee, 2016). Facial recognition reduces the lines for check-in, ticket purchase or passport control or even to detect criminals and terrorists at airports (Saulat, 2018). In the hospitality industry, Borgata Hotel Casino and Spa in Atlantic City uses face recognition with cameras to identify card fraud customers. Nine Zero, a hotel in Boston, uses iris pattern recognition technology to identify guests (to provide additional guest security) for upscale suites (Bergstein, 2004).

Voice recognition uses various characteristics of the human voice, such as cadence, pitch, and tone (Levine, 2000). This enables people to interact with computers through voice recognition software. Voice recognition technology is used in the translation of different languages in tourism (to interact with people who speak different languages), in communicating with robots and giving voice commands to machines and robots (e.g., Amazon Echo, which includes the Alexa assistant, Google Home, equipped with Google Assistant, and Apple HomePod, complete with Siri) (Mills et al., 2010). Amazon Alexa, developed for the travel agency Expedia, enables users to easily manage their upcoming journeys with voice interaction technology. With Amazon Alexa, users can perform travel operations from flight information to hotel reservations and car rentals with voice control (revfine.com, 2020).