SPRINGER NATURE
Reference

Azizul Hassan
Editor

Handbook of Technology Application in Tourism in Asia

Springer

Handbook of Technology Application in Tourism in Asia

Azizul Hassan
Editor

Handbook of Technology Application in Tourism in Asia

With 127 Figures and 108 Tables

Springer

Editor
Azizul Hassan
Tourism Consultants Network
The Tourism Society
London, UK

ISBN 978-981-16-2209-0 ISBN 978-981-16-2210-6 (eBook)
https://doi.org/10.1007/978-981-16-2210-6

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd.
The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

Contents

Volume 1

Volume 2

Exploring Information Technology in Smart Tourism in Indonesia

22

Hengky Sumisto Halim

Contents

Abstract

Currently, the development of computer information technology (IT) is very rapid. Many of the tourism and hospitality industry enterprises are utilizing this technology in the context of smart tourism and hospitality (STH). In focus group discussion, the respondents argued that not all hoteliers and tourism businesses did not use all part of information technology in their efforts to develop the competitiveness of smart tourism and hospitality industry. This is due to the limited human resources that mastered the technology. It was found that many of the information technologies have not been utilized optimally by smart tourism and hospitality businesses. This can be predicted that in the future, this paper will become their reference to develop business development in the field of smart tourism while the digital information technology can increase the competitiveness of STH in the future.

Keywords

Information technology · Competitiveness · Smart tourism and hospitality · Indonesia

H. S. Halim (✉)
Bina Darma University, Palembang, Indonesia

A. Hassan (ed.), *Handbook of Technology Application in Tourism in Asia*,
https://doi.org/10.1007/978-981-16-2210-6_22

Introduction

The presence of technology in the tourism industry has created a new environment in the world of tourism. The popular term that refers to these conditions is smart tourism. It is one of the pillars of Smart City, as well as being an important element of Smart Economy. Smart tourism is a tourist activity that utilizes information computer technology (ICT) to facilitate access to efficient services for tourists. Smart tourism includes several destinations. First is creating a database related to tourism resources, supported by the development of the Internet of Things (IoT) and cloud computing, which focuses on improving tourism through identification and monitoring. Second is advancing tourist destination areas with tourism industry innovation for tourism promotion, enhancing tourism services and tourism management. Third is expand the scale of the tourism industry with a real-time information platform, integrating tourism service providers and the role of local communities.

Successful development of the tourism sector does not only depend on how many destinations it has, natural beauty, naturalness, and unique traditions or culture, but far more important is the quality of human resources who play a role in management of their management and tourism information which is managed with digital information technology that is corresponding.

One of the factors that causes the underdevelopment of the national tourism sector at this time is due to the management of information that is promotional and has not been able to maximize the effectiveness of available information technology. Therefore, it is necessary to develop a tourism information technology that functions as a supporter of leisure activities' information. It helped develop good media image of tourists that plan to visit their destination and choice of tourist destinations. This study explores the development of information technology in supporting smart tourism in Indonesia.

Smart tourism includes several destinations. First is creating a database related to tourism resources, supported by the development of the IoT and cloud computing, which focuses on improving tourism through identification and monitoring. Second is advancing tourist destination areas with tourism industry innovation for tourism promotion, enhancing tourism services and tourism management. Third is expanding the scale of the tourism industry with a real-time information platform, integrating tourism service providers and the role of local communities. Fourth is building smart tourism can improve the regional economic level (Pradhan et al., 2018).

The development of artificial intelligence (AI) in the future is the key to winning the competition. With AI, all digital data can be processed to analyze the trends of tourists and change behavior and interests of tourists as well as needs of tourists. For the government, AI is very important to making policies and regulations. As for tourism actors, AI needed to improve services and tourism business decision-making (Prentice et al., 2020; Tussyadiah, 2020).

Applications that apply augmented reality (AR) technology to smartphones helped promote tourism. The technology is able to make objects that were initially stationary by the process of scanning through a smartphone camera, into objects that

seem to move according to the expectations of tourists. In addition, the object also produces visual effects. Moreover, with AR technology, there are three characteristics that become the basis of which is a combination of real and virtual forms of tourist destinations in the form of three-dimensional models (Buhalis et al., 2019; Liao, 2016; Scarles et al., 2016).

Utilizing big data in the tourism sector has been implemented in several European countries (Line et al., 2020; Xu et al., 2020), for example, Estonia, which has been enumerating with the MPD since 2009. Because the application of Schengen Visa in the European Union makes the movement of tourists between European countries itself insignificant, there are no immigration checks across borders anymore. This technology can easily help tourist statistics and accurately record movements away in Europe (Inanc-Demir & Kozak, 2019; Sivarajah et al., 2017; Yang et al., 2017).

Blockchain is a decentralized digital ledger record, checking and verifying every process of withdrawal, payment, and tourism transactions. For the tourism business, the spectrum is quite broad, from using the ability of blockchain to reach remote consensus to being autonomous between users. This technology can help increase transactional productivity and security, reduce overall costs, and even reduce the potential for pauses or downtime if present in the supply chain (Line et al., 2020).

Cloud computing services have a large enough capacity to accommodate the data that users need. Therefore, data and applications can be accessed and owned by Internet users more easily. With cloud computing services, start-ups and business people no longer need to worry of their business still can run. There are five steps to adopting cloud computing (Raut et al., 2017; Yang et al., 2017):

- Phase determine the planning and implementation of the use of cloud computing to maximize tourism services in the field of information technology.
- Determine the strategy for implementing cloud computing and the future planned actions that have been previously determined.
- Determine cloud computing model and architecture.
- Implementation of cloud computing as needed.
- Application of cloud computing.

The implementation of the transformation of tourism into smart tourism certainly rests on such as the Internet of Things (IoT). In addition, it must also be balanced with the predictive ability and reasoning of the culprit. Smart tourism depends on the existence of physical infrastructure. For example, Barcelona is a city that spoilt tourists visiting there. In this city, there are interactive bus stops and plugs. There are also bicycle-borrowing facilities in the city that can be used by tourists traveling through the city and can be tracked down by a smartphone application (Prasath et al., 2020; Sánchez et al., 2020; Youn & Lee, 2020).

Chatbot facilitates customer support performance, so chatbot can help handle simple and general questions, while staff workers can focus on other complex issues so that tourists' satisfaction is maintained. Chatbot cannot completely replace the role of humans, but this artificial intelligence-based technology will be efficient enough to facilitate team performance in the digital age. One important thing, with

the development of this artificial intelligence technology, making chatbot will be able to more intelligently answer the questions on tourists at any time. WeChat and Facebook Messenger have taken advantage of chatbot technology. Users can now buy something by talking on a chatbot. This shows that in the future, the era of human interaction by using communication media with computers or machines will become common (Ivanov, 2020; Melián-González et al., 2019; Ukpabi et al., 2019).

Emerging technologies (ET) positions data as an important point in making artificial intelligence. Without it, it is impossible for artificial intelligence to exist. The reason is the more data, the smarter the artificial intelligence. In addition to data, artificial intelligence also requires many technologies and support services to make it more optimal. AI needs a lot of technology and services to support the growing need for innovation. Furthermore, ET as a tourism company that provides an on-demand cloud computing platform has had more than 20 years experience in the development of artificial intelligence. A number of technologies and artificial intelligence services are currently used by many tourism and hospitality companies (Edmunds et al., 2019; González-Rodríguez et al., 2020; Halaweh, 2019; Khezri et al., 2020).

Moreover, high-performance computing (HPC) welcomes the mega trend of big data. It helped tourism and hospitality industry in modernizing and strengthening their performance (Isler & Widmer, 2020; Puertas-Martín et al., 2020). It is also capable and efficient in managing the cloud and hospitality industry's data in modern data center. The complete range of solutions introduced include availability technologies for servers, storage, modern data center, HPC, Virtual Desktop Infrastructure (VDI), artificial intelligent (AI) platforms, and Internet of Things (IoT) solutions for processing tourism data more sophisticated so that it can help companies in providing predictions and future decisions through big data predictions (Kim et al., 2019).

IoT is an all-tourism information technology that is connected to the Internet, usually consisting of network devices and applications (DNA). With this technology, tourists that travel independently appear, which are usually referred to as self-organized holidays and independent travelers. So the tour will lead to an individual and very personal (more individual and more personal). In terms of tourism service providers, this technology can contribute to saving business and expenses (cost reduction). By using the Internet, tourism service providers can save time and expenses from geographical constraints. Tourism service providers from an area can easily enter foreign markets and reach more customers, and conversely, tourists can easily reach these tourism service providers through applications of their mobile phones (Mufaqih et al., 2019; Qu et al., 2016; Sánchez et al., 2020; Youn & Lee, 2020).

Payment gateway (PG) is a system used to authorize payment processes. The term Payment Gateway Indonesia is certainly no stranger to tourists that are in the world of e-commerce. Payment gateway is an important payment process that ensures the secure transactions between tourists and hotels, restaurants, and airplane tickets. For those who frequently shop at the online shop, security will also be guaranteed if the online shop uses a payment gateway service. Online shop for dealing and booking hotels and airline tickets who want to use the payment gateway service must meet

special requirements. Therefore, an online shop that uses these facilities is definitely a trusted online shop (Avhad et al., 2020; Bozveliev et al., 2020; Pon et al., 2020).

Furthermore, PG is also a service that processes online transaction and credit card licenses, such as when you choose to use bank transfer to pay a bill for purchasing a product. This service helps you carry out daily transactions safely. Besides that, this service processed in real time. The existence of this payment gateway certainly supports the effectiveness in making buying and selling transactions. Since more and more tourists are starting to understand technology, there will be more and more online shop shoppers, hotel bookings, airline ticket payments, and tourist destination purchase (Pon et al., 2020).

Recognition technology (RT) is one of the technological trends being studied for use in the hospitality industry to provide smoother biometric authentication. The guests can open the hotel door, checking in/out by using fingerprints technology or face scans. In addition, AI is developed to detect health or disease. Besides, RT also has IT systems from facial RT of voice printing recognition technology. Furthermore, the RT image can also record changes in food portions or patterns of the tourists and conduct a diet analysis in order to understand their food intake based on demographic elements (Ciftci et al., 2020; Liao, 2016; Scarles et al., 2016).

Wireless connection supports the tour in many ways. Firstly, it connected to a barcode scan at the destination. Secondly, the tourists can easily update their travel schedules through the wireless connection and network of the tourist village. Third, young tourists can share photos of tourist destinations with their family, friends, or colleagues. This word-of-mouth promotion from tourists to their relations is equipped with a wireless connection. Fourth, the tourist or tourists can easily access info about the weather conditions at the destination. They can easily arrange a visit schedule in the destination village according to their wishes (Feijóo et al., 2006).

This mixed-mode research interviews 540 of 600 respondents that returned the questionnaires throughout the Indonesian archipelago. It is about the architecture of information technology that supports smart tourism. Nevertheless, 60 of them are experts on information technology. This study developed 12 group discussions (Table 22.1) about architecture of information technology in smart tourism (Buhalis, 2019; Buhalis et al., 2019; Gretzel et al., 2015; Parwekar & Gupta, 2020; Pradhan et al., 2018):

Each group consists of 50 respondents that discuss about each factor of architecture of information technology. Each group had five experts on information technology (IT). The rest of respondent are IT staff of hotel, restaurants, and café, tur operator, and airport and government staff of each province. They discussed one topic (e.g., artificial intelligence) (Tussyadiah, 2020), while the other group discussed about augmented reality marketing and the last group discussed about wireless connectivity. Moreover, 189 respondents responded consistently in terms of it. The questionnaires are tabulated based on SAS/STAT (SAS Institute INC., NC, USA). The value $K > 0.6$ indicates performance that meets the requirements and according to mutual agreement among respondents.

Distribution of Respondents Throughout the Indonesian Archipelago (Fig. 22.1).

Table 22.1 Respondents of focus group discussions

No	Each group discussions' topics	Number of respondents including experts
1	Artificial intelligence	45
2	Augmented reality marketing	45
3	Big data	45
4	Blockchain	45
5	Cloud computing	45
6	Chatbot	45
7	Emerging technology	45
8	High-performance computing	45
9	Internet of things	45
10	Payment gateway	45
11	Recognition technology	45
12	Wireless connectivity	45

Source: Modified from Kim et al., 2019

Fig. 22.1 A map showing Indonesia's 34 provinces and their capital cities (Zakky, 2018)

Sumatera Island

1. Nanggro Aceh Darussalam Province and its capital Banda Aceh.
2. North Sumatra Province and its capital Medan.
3. West Sumatra Province and its capital Padang.
4. South Sumatra Province and its capital Palembang.
5. Lampung Province and its capital Bandar Lampung.

Java Island

6. DKI Jakarta Province and its capital Jakarta.
7. Yogyakarta Special Region Province and its capital Yogyakarta.

Nusa Tenggara and Bali Island

8. Bali Province and its capital Denpasar.
9. West Nusa Tenggara Province and its capital Mataram.

Kalimantan Island

10. West Kalimantan Province and its capital Pontianak.
11. East Kalimantan Province and its capital Samarinda.

Sulawesi Island

12. North Sulawesi Province and its capital Manado.
13. Gorontalo Province and its capital Gorontalo.

Maluku Islands and Papua

14. Maluku Province and its capital Ambon.
15. Papua Province and its capital Jayapura.

All respondents rated that most tourism-hospitality industries in Indonesia (Table 22.2) use cloud computing information technology (21.28%) and high-performance computing (20.74%). Both of these technologies are widely used in the smart tourism and hospitality industry (STHI).

Cloud computing services have a large enough capacity to accommodate the data that users need. Therefore, the data applications can be accessed or owned by Internet users more easily. With the cloud computing service, start-up tourism businesses no longer need to worry about their business can still run (Yang et al., 2017). Moreover, cloud computing in Tabanan Bali has used this technology to support tourism environmental management information systems and ticket payment processes. Besides, they made tourism business management flexible. Besides, they recorded tourist behavior.

Furthermore, the use of artificial intelligence, Internet optics, and high-level computing or high-performance computing (HPC) in the tourism and hospitality industry is very helpful in facilitating access to digital information that is indispensable for tourists. The collaboration also emphasizes digital transformation and an environment based on tourist information technology. This collaboration is expected to encourage better data transparency in the world of tourism and hospitality. In the

Table 22.2 Information technology in smart tourism

Indicators	Value	% Freq
Artificial intelligence	22	11.70
Augmented reality marketing	10	5.32
Big data	8	4.26
Blockchain	11	5.85
Cloud computing	40	21.28
Chatbot	8	3.72
Emerging technology	9	4.79
High-performance computing	39	20.74
Internet of things	19	10.11
Payment gateway	15	7.98
Recognition technology	3	1.60
Wireless connectivity	5	2.66
K = 0,35		

Source: Modified from González-Rodríguez et al., 2020

end, this also has an impact on increasing revenue, cost efficiency, and transparency in managing tourism data that is more efficient from upstream to downstream. The use of HPC technology for this big data varies, including for recording tourism and hospitality business transactions, financial records, telecommunications, video surveillance, climate, disaster, as well as other information to convey through the website. In addition, HPC has maximum performance with minimal electrical power (Isler & Widmer, 2020; More et al., 2020).

Secondly, the second level of priority results from the questionnaire tabulation indicated that artificial intelligence (11.70%) and internet of things (10.11%) became their second choice in supporting the development of STHI.

AI technology can determine the exact complaints about guests and see the complaint originates about room services so that it can be immediately followed up. Through this technology, hotel owners will be able to predict the moment that rooms fully occupied through AI analysis based on guest check-in trends. The government together with the perpetrators of tourism in the future must begin to develop artificial intelligence (AI). In the future, AI is the key to winning the competition. With AI, all digital data can be processed to analyze consumer trends, changes into consumer behavior and interests, as well as what consumers needed do. For the government, AI is very important to support and settling down policies and regulations. As for tourism, AI needed to improve services and business decision-making. It cannot be helped that AI becomes an important instrument in winning the world tourism competition in the digital era, and the local government and tour operator must be able to build cooperation with tourism start-up developers. It started from the developers of travel applications, accommodation, fintech, banking, and other services (Prentice et al., 2020; Webster & Ivanov, 2020).

As one of the pioneers of AI and Natural Language Processing (NLP) technology in Indonesia, conversational AI technology is a platform that focuses on facilitating interaction between computers and humans. AI is updating the word platform products of an integrated conversational platform. Unlike before where this platform only focused on the chatbot development process, this latest platform was developed to be a one-stop solution for developing and managing conversational AI solutions, ranging from managing conversations, developing virtual assistants for companies, integration between chatbots and operations customer service, making voice-based virtual assistants to managing marketing campaign activities.

These features were designed to create solutions by facilitating interaction with users through text conversations (chat) or through speech by voice. With the product update on Kata Platform, it will provide several solutions such as conversation management, development of virtual assistants for companies, integration between chatbots and customer service operations, creating voice-based virtual assistants, and managing to market campaign activities. With this platform for developer-based technology, AI can work with developers, business people, and experts from various sectors to build more solutions that are relevant.

Information about tourist data in real time has not been sufficient to cause tourist mobility that is not well controlled, while there arises concentration of tourist mobility that has an impact on the disparity between tourist areas. On the other

hand, the development of increasingly sophisticated technology brings the world to the technology patterns. IoT (Internet of Things) is one of the concepts in this era, which in this case can be utilized in a tourism entrance data collection system that operated remotely on the Internet, so that data onto incoming and outgoing tourists can be recorded. However, this technology commonly used to control lights and room temperature. Meanwhile, the target of installing 200 million Internet of Things (IoT) sensors with average revenue per user (ARPU) reaches US$ 2 billion by all industrial sectors in Indonesia by 2020 (Mufaqih et al., 2019; Sánchez et al., 2020).

This system designed by developing remote electronic device utilizes ultrasonic sensors and a microcontroller that is connected to an Internet server. It used an Ethernet module. This tool can be accessed to the Internet on websites and applications for mobile devices that designed. Through this system, tourists can get information related to the condition of the number of tourists that are in the destination in real time. Therefore, system users can choose destinations based on the latest data. The trial ran is to build miniature tourist entrances that connected to the IoT system and can be accessed in real time via online media. It hoped that this system could be used as a reference to the latest technology in overcoming problems of tourism mobility in Indonesia. The number of IoT devices currently installed is still 0.35 percent of the total target set. This year, the adoption of IoT sensors that have been realized in Indonesia reached 150 million devices or with ARPU equivalent to US $ 1.5 billion.

The third choice of respondents for the information technology architecture they used in STHI were payment gateway (7.98%), blockchain (5.85%), and augmented reality marketing (5.32%).

A payment gateway is a payment equivalent of a physical virtual terminal point of sale, which is located in most retail outlets, hotels, and several tourist destinations. Payment gateway (PG) performs an important role in processing and authorizing payments or transactions between customers and traders (Avhad et al., 2020). Furthermore, PG encrypts sensitive information and payment details. The Indonesian Fintech Association initiated and provided education on online payment transaction systems or payment gateways to the public and the tourism and hospitality industry for research on landscape payment gateways (PG). The function of PG and it also the role of other players to drive the digital economy, bearing in mind that this is something that has been declared by the government. PG accelerates the growth of the digital economy in Indonesia. It can quickly serve as a variety of new business models that arise due to technological developments and people's lifestyles. Furthermore, PG is a solution to the fragmented payment channel conditions in Indonesia, which has been a barrier for small businesses to get into the payment system and grow. In general, Indonesia's payment gateway service protects transactions through three tracking systems (Pon et al., 2020). Address Verification System (AVS) is a tool used to adjust customer billing data onto the address registered on the card. Payment Gateway Indonesia also usually uses 3D Secure Password to authorize transactions (Bozveliev et al., 2020).

Four things could utilize blockchain in information technology, namely, money, passports, reservations, and insurance. Blockchain application of tourism is about

money. It is not possible to pay with Bitcoin, and there are already many places and ATM machines that can help convert Bitcoin to local currency through crypt exchanges. Blockchain can also be used to store important documents such as passports, visas, permits, identity cards, and drivers' license. Therefore, there will no longer be cases of fake or important documents stolen by criminals. That way, tourists can use their time more efficiently. Meanwhile, tourism insurance against blockchain technology that is decentralized peer to peer offers cheaper and transparent costs (Line et al., 2020).

It is a good news for the world of tourism, especially for tourists that have a hobby of traveling through the world using Bitcoin. Bitcoin is known as a digital currency with various advantages, such as its nature controlled by a particular institution/individual. It is affected by inflation, and it is safe to carry and transact anywhere because it moves on a peer-to-peer technology called blockchain. Bitcoin can be stored in electronic media that is within the grasp of tourists, such as smartphones they use, in the form of applications that are usually referred to as wallet or Bitcoin wallet. This wallet can be opened with the Web or in other devices so they also do not need to worry if their smartphone is lost because the money is still safely stored in the form of Bitcoin and can be accessed on other devices. With Bitcoin, they do not have to bother carrying large amounts of conventional money when traveling and no longer need to worry about holding a wallet.

Until then, Bitcoin has great benefits of Hawaii because most of growing encourage economic growth of tourism. Not only in Hawaii but also in The Hague, Loyyal, a company engaged in technology in New York, is working with Dubai and Norway in integrating the tourism sectors of the two countries with blockchain technology.

With augmented reality (AR) technology, guests can take a virtual tour of the rooms and around the hotel to find out the facilities and attractions offered around the hotel (Buhalis et al., 2019). Smart tourism supported by AR technology can enable tourists to carry out activities such as booking hotels, accessing information while at the destination, navigating to and around the destination, translating text or signs and conversations, and finding alternative dining options and entertainment. It can be done only through an application on mobile or smartphone devices. Therefore, this technology can revolutionize the experience of traveling at tourists to become smoother and easier (seamless), interactive, and simpler (Scarles et al., 2016).

There are many ways to make it done to attract foreign tourists visiting Indonesia. One of them is Indonesia In Your Hands (IYH) augmented reality (AR) mobile application. Many of the tourists rely on an Internet connection between their cellphones to find information about the location of tourist destinations. To continue to develop tourism in Indonesia, the Ministry of Tourism and Creative Economy is taking a step forward by supporting the promotion of Indonesia IYH, the AR mobile application. The purpose of developing this application is to make it easier about tourists to find information related to tourism objects and tourism support facilities through mobile phones that are always in their grasp.

The AR Indonesia IYH mobile application is the first application of the world that has thousands of databases of tourism objects such as national parks, museums, cultural reserves, national zoos, and historical relics in Indonesia, which can be

viewed only through a screen of a cellphone using this technology. The ability of this mobile application is to find the location of the nearest tourist attraction and find out information about these attractions based on the coordinates obtained from the cellphone. There are also room reservation facilities. This application can be used for mobile phones with technology such as Symbian, Android, iPhone, Blackberry, and Java.

IYH's work program includes creating an AR Miniature Park in Taman Mini Indonesia Indah (TMII), where visitors can use their cellphones to view TMII in a unique and interesting way. Also, tourism in West Java became the first destination to make all attractions in West Java able to use AR as a means of tourism promotion. Promotion of tourism in Indonesia must be more mainstream in using digital media, especially again supported by AR technology to create a different color in the promotion of Indonesian tourism.

In addition, a tourist destination that uses AR is city tourists that had mostly have trouble in finding a location from the place of interest in the form of rides and public facilities. At present, there is a solution to this problem, namely, the dissemination of the map the East Java are considering vulnerable causing errors in reading directions. Navigation applications that are able to overcome these problems through 100% conformity can be interpreted by considering navigation time.

The fourth level of the respondents' choice for supporting STHI is emerging technology (4.79%), big data (4.26%), and chatbot (3.72%).

Emerging technologies (ET) served smart tourism both technically and through proven innovation. This requires the commercial maturation of tourism and hospitality. So it is economically feasible to be able to use the industrial scale of STHI. Generically, there is still a gap between research activities and technical services with the two industrial activities. To address these issues, commercialization efforts are need that had not been handling well so far. This commercialization includes business incubation, which finalizes an innovation that has been scientifically proven. So it is produced completely for the free market. Digital technology helps give birth to start-up industries and technopreneurship from new technologies or emerging technologies (ET) that have been proven to be more resilient to economic crises. In addition, ET facilitates and intermediates that can connect between science and technology providers and users in the tourism and hospitality industry (Edmunds et al., 2019; Halaweh, 2019; Khezri et al., 2020).

Big data technology in Indonesia is very geographically broad and has insufficient infrastructure to cover border areas, such as North Kalimantan, East Papua, and Timor Island, not to mention the border at sea, which is far more difficult that caused administrative data onto foreign tourists to Indonesia (especially at land/sea borders) tend to be unpredictable (Xu et al., 2020). Big data helps tourism actors to accommodate and process the opinions of tourists in the form of complaints, criticisms, suggestions, and all testimonials both negative and positive (Inanc-Demir & Kozak, 2019). This intelligence centered displays the movement toward foreign tourists and tourists in real time updates including strategy data to deal with competitors: Malaysia as a common enemy and Thailand as a professional enemy for Indonesian tourism.

Furthermore, data obtained from digital traces of tourists are obtained from various sources, such as social media, tourist portals, business applications, chatbots, and others. This data can be obtained directly (real time), so it is very useful for speed in decision-making. With this big data, actors in the tourism industry such as tourism service providers or destination managers can easily obtain data on tourist behavior such as movements, preferences, travel decisions, and hotel or restaurant selection activities.

In addition, positive and negative indicators are also displays referring to the global standard. Meanwhile, the use of big data in the tourism sector has been appealing to several European countries, Estonia, which has been conducting statistics with Mobile Positioning Data (MPD) since 2009. Furthermore, Belgium, Ireland, Spain, and the Netherlands have conducted pilot studies of data roaming.

Chatbot application for tourist information makes it easier about tourists to find information about the addresses of tourist attractions. This application was built with the use of Natural Language Processing approach. This chatbot application uses text mining as a medium for reasoning. The modeling system used for this application is the Unified Model Language. WeChat and Facebook Messenger have taken advantage of chatbot technology. Users can now buy something by talking to chatbot. This shows that in the future, the era of human interaction or communication with computers or machines will become common. It has been starting since now. Chat service used an automated system or autoresponder. In tourism and hospitality information services, the media chat is only a chat tool for tourists that means they are chatting with the speaker or reciprocating their conversation. The chatbot reply to the conversation or respond is a robot that is set as an autoresponder (Haldén & Yao Håkansson, 2020; Ruf et al., 2020; Saglam & Nurse, 2020).

Finally, the last level priority of the respondent opinion in using information technology to support STHI is wireless connectivity (2.66%) and recognition technology (RT, 1.60%).

Strong wireless connectivity coverage is wireless Internet connection technology in hotels or tourist destinations through access points that provide wide and strong coverage in all rooms and indoor and outdoor areas such as swimming pools, parks, and others. Tourism and mobile device solutions, allowing facilities available the smart desk control the temperature or a digital hotel tour and access hotel services, arrange wake-up calls, install alerts to not being disturbed, and order dinning services at room.

This RT opens the hotel rooms by the guest. Meanwhile, Angkasa Pura II Indonesia began using facial recognition technology, biometric facial recognition technology (BFRT), for the process of checking in and boarding to the aircraft at Banyuwangi International Airport to automate passenger flow to better ensure flight safety (Liao, 2016). The concept of Eco-Green Airport itself is seen from the minimal use of air-conditioning (AC) by utilizing air circulation of the grating on the wall of the passenger terminal as well as the spread of green grass on the roof of the terminal. The combination of eco-green and smart airport concepts in Banyuwangi greatly enhances the customer or tourist experience and creates a hassle-free airport. Currently, Banyuwangi International Airport provides two

alternatives to process check-in. The first alternative is through a check-in counter where passengers who want to put luggage in the baggage of the aircraft must choose this option. The luggage is also registered independently by the passenger and then put into the baggage handling system. Meanwhile, the second alternative is to use a self-check-in engine that can be selecting for airplane passengers with enough luggage in the aircraft cabin. In both alternatives, when processing at the check-in counter and self-check-in, each passenger records their face using the available BFRT. After the entire check-in process is complete, the passenger of the plane then goes to the boarding lounge to wait for departure. When boarding or boarding time arrives, passengers then head to the autogate to tap the boarding pass and then undergo verification through the BFRT process. If the boarding pass and face matched the data, the autogate will open automatically, and passengers are welcome to board the plane. Through BFRT, the boarding process currently uses the autogate without the need for personnel on duty. So these personnel can serve the other areas. This recognition technology makes airline passengers or tourists to prefer to process departures independently through self-check-in, mobile apps, and self-baggage drop (Ciftci et al., 2020; Scarles et al., 2016).

Discussions

The development of information technology is currently very easy and helps tourists in traveling. Travelport responded to this big opportunity. They invested billions of dollars to develop information technology to support digital tourism industry. Travelport also invests in Indonesia, which is visited by the third-largest number of digital tourists in the world. Asia Pacific Travelport's Managing Director said the travel and hospitality industry, which is estimating to be worth US$ 7.6 trillion globally, must continue to adapt to technological developments. According to him, the Indonesian tourism industry is very healthy in terms of business and supported by a strong economy. The level of innovation and adoption in Indonesia is also good. Indonesia's tourism sector has recorded a significant growth of 25.68% so far this year, surpassing the Asia Pacific region and other emerging markets (Yasa, 2017). Meanwhile, Travelport survey results show Indonesia is the country with the third largest number of digital tourists in the world. Digital tourists are tourists that use digital devices when planning, ordering, and traveling. The survey revealed that Indonesian tourists really liked and appreciated the good digital experience provided by airlines.

Indonesian tourists are actively researching in preparing travel plans when they travel. As many as 93% of Indonesian tourists do research using videos and photos from social media, greater than the Asia Pacific average of 76%. Furthermore, when booking a trip, 68% of Indonesian travelers book their travel ticket via smartphone. This percentage is the highest compared to other countries in the world. However, the tourism industry that applies technology in the future will increase the number of transactions. The tourism industry should innovate to provide more experience of

travelers with supporting information technology to provide easy access to tourism and hospitality data.

In terms of travel agent, Travelport Indonesia has grown significantly. Currently, it is the fastest and most rapid development. The opportunity for the travel industry by adopting digital information technology (DIT) is still very large going forward. It is predicting that in 2036, the number of tourists traveling through Indonesia will increase threefold from 2016. This makes mobilization simpler for them, when viewed from the data triples it is a fantastic number. This is an enormous business opportunity. The development of DIT huge tourism market's potential can be captured as an opportunity to provide services that are relevant to the needs. The use of DIT is an effort that can increase efficiency and productivity to multiply. The important point of professional travel agents to stay relevant is a large opportunity if used properly, producing extraordinary growth and capturing an unusually big opportunity.

Travelport invests in developing DIT continuously and innovating along with developments and trends, so as to not be left behind. Travelport has now adopted machine learning technology that utilizes artificial intelligence to provide services and solutions for actors in this tourism business. Artificial intelligence (AI) and machine learning are important (Prentice et al., 2020). They can learn much from there. The machines can learn, and many things in AI are developing. Travelport is a DIT-based tourism service company that operates a commercial travel, which has net income of more than US$ 2.3 billion in 2016, facilitating travel trade by connecting travel service providers in the world business travel market.

Factors that hinder or accelerate the pace of tourism activities are the promotion patterns and information management systems that have an impact on the known or unknown tourist attraction, ease in obtaining information on tourist destination data, and easy access to tourist sites. In addition, it is important to gain the benefits of the tour such as the availability of transportation, facilities, and infrastructure. Likewise, the uniqueness of objects, culture, and local wisdom of the community and the trend of travel also influence the quality of tourist attractions. It is about the pattern of their activities on tourism sites.

Furthermore, tourism trends in the future are expecting to undergo a number of changes. Advances in technology make it easier about travelers' travel planning. In addition, the tourists also look for new spots that were not previously glimpsing. This condition must be a concern for tour managers if they do not want to lose the momentum of travel trends that continue to move. The form of smart tourism and hospitality has a very big impact on the hospitality that leads to an increase in regional income.

The ICT greatly evolved the development of the tourism industry, with ICT information and communication being done very quickly, precisely, and accurately, and able to reduce human error, for example, the emergence of Internet-based traveled applications Tourism Information. By using the software, information about ticket prices, hotel/inn room prices, availability of accommodation, certainty of bookings, tourist information that will come, ease of booking hotels and transportation tickets in any situation and anywhere can be fulfilling. This

convenience makes tourists feel happy and causes the number of movements and tourist arrivals to increase.

The development of ICT is also very helpful in opening information or introducing destinations that are well known or new to prospective tourists that have arrived, introducing the cultural uniqueness and local wisdom of the people around the destination. The very flexible movement of information also affects the overall movement toward tourists. For example, the ease of information obtained by tourists or potential tourists from Path articles in the form of freelance articles or official information on social media and the Internet about tourism in certain destinations is very helpful in spreading tourists in all directions the destination. With the understanding gained by tourists about tourist sites more broadly, tourists are not fixated on famous destinations or that had been labeled in general as iconic destinations.

Tourists can move toward destinations other than the iconic destination to destinations that were initially untouched due to lack of information. The impact on it all is creating a new experience of tourists who will be liked and instill the suggestion to come back again bringing relatives or relatives who will ultimately increase the number of tourist visits. The increase in the number of visits and the even distribution of tourist movements has ultimately greatly driven the regional economy and finally increased the country's foreign exchange. From the description of the bag, we can understand that smart tourism is a combination of e-commerce and tourism information and its benefits to tourism or economic bodies. The available information can be used as a strategic policy foundation and change the concept of tourism innovation more effectively.

Information communication technology strongly supports the effectiveness of tourism and hospitality promotion. Tourists now no longer patiently wait for tourist information that was previously provided by the service bureau or organization that holds an interest. For this reason, Indonesian tourism movers provide websites or pages in the Internet world to fulfill these tourists' desires. E-commerce or E-business produce ticket booking services, hotel reservations, transportation reservations, destination ticket reservations, and online travel forms bookings. The tourism sector is a sector that has enormous potential for increasing state or regional income and increasing community income. It can be managed properly.

Recent research conducted by Booking.com says that 2020 will be a full year of exploration. Technological advances can help tourists explore various vacation drive spots. Entering a new decade, researchers see the travel industry responding to travelers that are sustainable, curious, and technologically well informed. The industry must also respond by developing products, services, and functions to make it easier about everyone to explore the world. Research conducted by Booking involved 22,000 travelers in 29 markets. In addition, research also considers reviews of 180 million verified travelers. According to Booking, the emerging travel trends are not only for 2020 but also in the coming years. According to the Dutch-based company, in addition, next year's tourism trend will be filled with other new things with the use of technology. These are the emergence of a "second city" traveler. This term refers to the exploration of tourist destinations.

Furthermore, tourism activities in this second destination, according to the Booking survey, are intending to reduce over-tourism or excessive tourism and protect the environment. It stated that as many as 54% of global travelers want to take part in reducing excessive tourism. Meanwhile, 51% are willing to exchange their initial destination with a place that is not too famous but similar, if they know that the environmental impact is smaller. Tourist concern for the environment is also evident from the results of a survey that states as many as 60% of respondents want to access application-based services and recommend travel destinations to others. Booking estimates that these findings encourage tourism companies to introduce various functions that make it easier about travelers to find a destination city/second area. This step has the potential to bring up collaboration between the travel ecosystems. To meet this demand, by 2020, there will be more applications with artificial intelligence that offer specific recommendations about destinations, places to stay, and activities based on the preferences and travel history of tourists, as well as important factors such as weather and popularity.

Responding to the results of the survey, entrepreneurs in the tourism sector in the country consider that Indonesia can take advantage of this trend. There are many tourist destinations outside of the more famous tourist destinations. However, the lack of access to transportation and the high price of tickets are problems. Most of these tourists traveling through the destination of the second city or the second destination are indeed loved by foreign tourists at this time. However, the problem is the lack of access to transportation and the high cost of accommodation including flight tickets. The recent trend of foreign tourists visiting the second tourist destination. For example, if foreign tourists have been to Bali as a main destination, there will be a trend for other interesting tourist attractions such as Lombok or Labuan Bajo even though they travel through Sulawesi and other eastern regions. The government together with the association also continues to buzz New Bali as a new tourist destination. He added that the use of technology for foreign tourists is expected to increase. On the other hand, the potential for travel consultants is also still large. The potential for tourism in 2020 in the country still has great prospects even though the global economy is still overshadowed by a recession. For foreign tourists, the condition has no effect. They prefer to make a vacation to their country.

Meanwhile, 71% of tourists believe that parents also need to rest on their self. Another 2020 tourism trend revealed by Booking is culinary-hunting at tourist sites. This trend makes tourists compete to make reservations about prestigious restaurants. Another challenge to the future is the ability of the government and tourism businesses to make changes. The behavior of tourists, especially millennial tourists, has changed to become digital travelers. The Ministry of Tourism (Kemenpar) said that 70 percent of travelers do search and share in digital media. As many as 50 percent of inbound travelers are digital-perceptive millennials. The market is expecting to continue to grow with a large influencing power. In this section, social media plays a very important role in disseminating information directly to the public. Another thing that is expecting to be a trend in the tourism industry going forward is the more mature travel plans of travelers. This can be seen from the desire for the respondents. They are almost 23% (aged 18–25 years) want to retire less than

55 years in order to enjoy a vacation. In the future, it is estimated that there will be a change in the mind of the traveler where they will start planning their golden years. Nearly two-thirds (65%) of global travelers saw travel as the perfect way of spending leisure time, while nearly half (47%) of global travelers planned to be bolder in their travel choices as they retired.

Conclusion

Based on information technology architecture, this study found that the use of information technology has not been optimal. The tourism and hospitality businesses have not fully utilized the technology in supporting their businesses. Cloud computing and high-performance computing are two information technologies that are frequently employed in the tourism and hospitality industries. As a result, hoteltourism business activities become more accessible with the support of information technology.

On the other hand, the use of payment gateway, blockchain, augmented realty marketing, emerging technology, big data, and chatbot technologies has not been utilized optimally. In fact, they still rarely use technology recognition and wireless connectivity. It is useful to support the development of smart tourism and hospitality industry.

It seems clear that the development and construction of smart tourism's competitiveness is still wide open. Tourism and hospitality businesses can still develop their businesses by optimizing technology infrastructure equally in their businesses. This can help ease access to digital data information on all travelers.

References

Avhad, P., Bhanushali, H., Bhatt, K., & Rathod, M. (2020). *Canteen automation system with payment gateway.* Retrieved from: SSRN: https://ssrn.com/abstract=3568597 or https://doi.org/10.2139/ssrn.3568597. Accessed 7 May 2020.

Bozveliev, B., Sotirov, S., Simeonov, S., & Videv, T. (2020). Generalized net model of common internet payment gateway with intuitionistic fuzzy estimations. In O. Castillo, P. Melin, & J. Kacprzyk (Eds.), *Intuitionistic and Type-2 Fuzzy logic enhancements in neural and optimization algorithms: Theory and applications* (Studies in computational intelligence, 862) (pp. 91–98). Springer.

Buhalis, D. (2019). Technology in tourism-from information communication technologies to eTourism and smart tourism towards ambient intelligence tourism: A perspective article. *Tourism Review, 75*(1), 267–272.

Buhalis, D., Harwood, T., Bogicevic, V., Viglia, G., Beldona, S., & Hofacker, C. (2019). Technological disruptions in services: Lessons from tourism and hospitality. *Journal of Service Management, 30*(4), 484–506.

Ciftci, O., Choi, E. K., & Berezina, K. (2020). Customer intention to use facial recognition technology at quick-service restaurants. *e-Review of Tourism Research, 17*(5), 753–763.

Edmunds, M., Hass, C., & Holve, E. (2019). Back to the future: Emerging technology, social, and cultural trends affecting consumer informatics. In M. Edmunds, C. Hass, & E. Holve (Eds.), *Consumer informatics and digital health* (pp. 377–398). Springer.

Feijóo, C., Gómez-Barroso, J. L., Ramos, S., & Rojo-Alonso, D. (2006). Active policy measures against the digital divide based on mobile/wireless connectivity development: The Latvian experience. *International Journal of Mobile Communications, 4*(6), 727–742.

González-Rodríguez, M. R., Díaz-Fernández, M. C., & Gómez, C. P. (2020). Facial-expression recognition: An emergent approach to the measurement of tourist satisfaction through emotions. *Telematics and Informatics, 51*, 101404.

Gretzel, U., Sigala, M., Xiang, Z., & Koo, C. (2015). Smart tourism: Foundations and developments. *Electronic Markets, 25*(3), 179–188.

Halaweh, M. (2019). Model of emerging technology adoption (META): Virtual reality as a case study. *Journal of Information and Knowledge Management, 18*(2), 1950020.

Haldén, F. J., & Yao Håkansson, J. (2020). *A comparison between chatbots for handling administrative healthcare tasks*. Retrieved from: http://urn.kb.se/resolve?urn=urn:nbn:se:kth:diva-269421. Accessed 1 June 2020.

Inanc-Demir, M., & Kozak, M. (2019). Big data and its supporting elements: Implications for tourism and hospitality marketing. In M. Sigala, R. Rahimi, & M. Thelwall (Eds.), *Big data and innovation in tourism, travel, and hospitality: Managerial approaches, techniques, and applications* (pp. 213–223). Springer.

Isler, C. A., & Widmer, J. A. (2020). Parallel genetic algorithm and high performance computing to solve the intercity railway alignment optimization problem. In M. Marinov & J. Piip (Eds.), *Sustainable rail transport. Lecture notes in mobility* (pp. 159–186). Springer.

Ivanov, S. (2020). The first Chatbot of a tourism/hospitality journal: Editor's impressions. *European Journal of Tourism Research, 24*, 1–6.

Khezri, K., Saeedi, M., Morteza-Semnani, K., Akbari, J., & Rostamkalaei, S. S. (2020). An emerging technology in lipid research for targeting hydrophilic drugs to the skin in the treatment of hyperpigmentation disorders: Kojic acid-solid lipid nanoparticles. *Artificial Cells, Nanomedicine, and Biotechnology, 48*(1), 841–853.

Kim, Y., Kim, C.-k., Lee, D. K., Lee, H.-w., & Andrada, R. I. T. (2019). Quantifying nature-based tourism in protected areas in developing countries by using social big data. *Tourism Management, 72*, 249–256.

Liao, T. (2016). Is it "augmented reality"? Contesting boundary work over the definitions and organizing visions for an emerging technology across field-configuring events. *Information and Organization, 26*(3), 45–62.

Line, N. D., Dogru, T., El-Manstrly, D., Buoye, A., Malthouse, E., & Kandampully, J. (2020). Control, use and ownership of big data: A reciprocal view of customer big data value in the hospitality and tourism industry. *Tourism Management, 80*, 104106.

Melián-González, S., Gutiérrez-Taño, D., & Bulchand-Gidumal, J. (2019). Predicting the intentions to use chatbots for travel and tourism. *Current Issues in Tourism, 24*, 192–210.

More, N., Nikam, V. B., & Banerjee, B. (2020). Machine learning on high performance computing for urban greenspace change detection: Satellite image data fusion approach. *International Journal of Image and Data Fusion, 11*, 218–232.

Mufaqih, M. H., Kaburuan, E. R., & Wang, G. (2019). *Applying smart parking system with internet of things (IoT) design*. Paper presented at the3rd Nommensen International Conference on Technology and Engineering 2019 (3rd NICTE). Sumatera Utara: Nommensen HKBP University, the 25th–26th July, 2019.

Parwekar, P., & Gupta, G. (2020). Cloud data for marketing in tourism sector. *Smart Innovation, Systems and Technologies, 165*, 143–153.

Pon, S. J., Ramya, S. S., Christal, A. V., & Mythili, K. (2020). Secured payment gateway for authorizing E-commerce websites and transactions using Machine Learning Algorithm. In *2020 International Conference on Computer Communication and Informatics (ICCCI)*, Coimbatore: the 22nd–24th January, 2020.

Pradhan, M. K., Oh, J., & Lee, H. (2018). Understanding travelers' behavior for sustainable smart tourism: A technology readiness perspective. *Sustainability, 10*, 4259.

Prasath, J. S., Ramachandraiah, U., & Muthukumaran, G. (2020). Modified hardware security algorithms for process industries using internet of things. *Journal of Applied Security Research, 16*, 127–140.

Prentice, C., Dominique Lopes, S., & Wang, X. (2020). Emotional intelligence or artificial intelligence– An employee perspective. *Journal of Hospitality Marketing and Management, 29*(4), 377–403.

Puertas-Martín, S., Banegas-Luna, A. J., Paredes-Ramos, M., Redondo, J. L., Ortigosa, P. M., Brovarets, O. O., & Pérez-Sánchez, H. (2020). Is high performance computing a requirement for novel drug discovery and how will this impact academic efforts? *Expert Opinion on Drug Discovery, 15*, 981–985.

Qu, T., Lei, S. P., Wang, Z. Z., Nie, D. X., Chen, X., & Huang, G. Q. (2016). IoT-based real-time production logistics synchronization system under smart cloud manufacturing. *International Journal of Advanced Manufacturing Technology, 84*(1–4), 147–164.

Raut, R. D., Gardas, B. B., Jha, M. K., & Priyadarshinee, P. (2017). Examining the critical success factors of cloud computing adoption in the MSMEs by using ISM model. *Journal of High Technology Management Research, 28*(2), 125–141.

Ruf, B., Sammarco, M., Aigrain, J., & Detyniecki, M. (2020). Pharmabroad: A companion Chatbot for identifying pharmaceutical products when traveling abroad. In J. Neidhardt & W. Wörndl (Eds.), *Information and communication technologies in tourism 2020* (pp. 218–228). Springer.

Saglam, R. B., & Nurse, J. R. C. (2020). *Is your chatbot GDPR compliant? Open issues in agent design*. Retrieved from: http://arxiv.org/abs/2005.12644. Accessed 2 June 2020.

Sánchez, L., Lanza, J., & Muñoz, L. (2020). From the internet of things to the social innovation and the economy of data. *Wireless Personal Communications, 113*, 1–15.

Scarles, C., Casey, M., & Treharne, H. (2016). Enriching the visitor experience: Augmented reality and image recognition in tourism. In *CAUTHE 2016: The changing landscape of tourism and hospitality: The impact of emerging markets and emerging destinations* (pp. 1177–1184). Blue Mountains International Hotel Management School.

Sivarajah, U., Kamal, M. M., Irani, Z., & Weerakkody, V. (2017). Critical analysis of big data challenges and analytical methods. *Journal of Business Research, 70*, 263–286.

Tussyadiah, I. (2020). A review of research into automation in tourism: Launching the annals of tourism research curated collection on artificial intelligence and robotics in tourism. *Annals of Tourism Research, 81*, 102883.

Ukpabi, D. C., Aslam, B., & Karjaluoto, H. (2019). Chatbot adoption in tourism services: A conceptual exploration. In C. Webster & S. Ivanov (Eds.), *Robots, artificial intelligence, and service automation in travel, tourism and hospitality* (pp. 105–121). Bingley.

Webster, C., & Ivanov, S. (2020). Robotics, artificial intelligence, and the evolving nature of work. In B. George & J. Paul (Eds.), *Digital transformation in business and society* (pp. 127–143). Springer.

Xu, F., Nash, N., & Whitmarsh, L. (2020). Big data or small data? A methodological review of sustainable tourism. *Journal of Sustainable Tourism, 28*(2), 147–166.

Yang, C., Huang, Q., Li, Z., Liu, K., & Hu, F. (2017). Big data and cloud computing: Innovation opportunities and challenges. *International Journal of Digital Earth, 10*(1), 13–53.

Yasa, A. (2017). *Tourism Industry technology: Indonesia's third largest digital tourist.* Retrieved from: https://kalimantan.bisnis.com/read/20171115/435/709174/teknologi-industri-pariwisata-wisatawan-digital-indonesia-ketiga-terbesar. Accessed 2 June 2020.

Youn, K.-H., & Lee, J.-Y. (2020). The effect of social support on service quality of youth training facility employees in internet of thing environment: The Mediating Effect of Empowerment. *Journal of the Korea Internet of Things Society, 6*(1), 31–38.

Zakky. (2018). *34 Names of Provinces in Indonesia and their capital cities complete*, ZonaReferensi.com. Retrieved from https://www.zonareferensi.com/provinsi-di-indonesia/. Accessed 1 June 2020.

Part XII

Technology Application in the Asian Tourism Industry: Smart City Involvement