A Critical Insight into the Role of Artificial Intelligence (AI) in Tourism and Hospitality Industries

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Abstract

Gone are the days when you had to contact a travel agent, see him in person, and make a never-ending series of irritating phone calls to enquire about travel and hotel arrangements. The purpose of this article is to emphasise the importance of Artificial Intelligence (AI) and Robotics in the tourism and hospitality sectors. Various technologies are being initiated into the tourism and hospitality industries in order to improve service and consumer experience and carveout a favourable image of their organizations. This study focuses on the predicted developments and challenges in adopting Artificial Intelligence in the tourism and hospitality industries. Artificial Intelligence (AI) is anticipated to have a significant impact on these sectors that will be reflected in the visitor's behaviour in the future. In this research, we intend to look at how Artificial Intelligence (AI) has impacted and continue to transform the important processes in the tourism and hospitality business. We will explore and analyse the pros and cons of the technological impacts of IT foundations of AI as they are applied to travel, tourism and hospitality sectors. Also, we will take a closer look and throw light on the AI systems and applications available in these industries in which the majority of these technologies are being implemented. Finally, we will address the critical concerns such as privacy, prejudice, and ethics in these sectors.

Keywords: Robots, Technology, Tourist, AI enabled phones, Chatbots, Maximum Likelihood Algorithm

Introduction

Artificial Intelligence (AI) technology is one of the most ingenious innovations in today's technology-driven world that is revolutionizing many sectors globally. Development of computer systems that can execute jobs and activities that need human intellect is known as Artificial Intelligence (AI). The earliest appearance of Artificial Intelligence was in John McCarthy's Dartmouth Summer Research Project in 1956. Artificial Intelligence is typically characterized as a group of technologies capable of simulating human intellect in the

problem-solving process. Artificial Intelligence (AI) is based on large amounts of data, computing power, and algorithms. It encompasses a broad field of computer science that focuses on creating intelligent computers that can perform activities that would normally need human intelligence. Artificial Intelligence has reached at an elevated point in the twenty-first century, and has the potential to have substantial influence on individuals, companies, and industries. Many AI achievements have emerged over the years that include predictive searches, image identification, facial recognition systems, voice recognition systems, natural language processing, and the idea of mobile robots to name a few. Engineers were able to harness enormous amounts of data, construct efficient robots, and work on enhanced processing power-loaded tools and technologies. Main industries where Artificial Intelligence has had an impact include automotive sector, banking and financial services, media and entertainment, manufacturing, energy, telecommunications, healthcare, life sciences, travel, tourism and hospitality.

Importance of Artificial Intelligence in the corporate sector also has grown substantially over the last decade, with the travel and hospitality industry witnessing much broader use of AI in the recent years. On a worldwide scale, the tourist and hospitality sectors have experienced remarkable development and financial gains in the twenty-first century. AI applications are consistently being developed and tested in the industries.

Many individuals, fond of travelling nationally or internationally, are prepared to spend money on tourism and travel these days. They prefer to quality services and customized packages being provided that are both time-effective and cost-effective. Consequently, this expenditure has enhanced the demand in tourism and hospitality industries. These industries are also creating user-friendly packages of products and services which reflect their overall performance qualitatively (Alamanda et al., 2019).The tourism and hospitality industries are rapidly growing and have become one of the world's most powerful industries, with the ability to alter a country's economic health. Artificial Intelligence (AI) has made its way into the tourist and hospitality industry, where it is being utilized to achieve a competitive advantage in a fast-paced market.

The objective of this paper is to vindicate how Artificial Intelligence (AI) has impacted the tourism and hospitality sectors and brought about revolutionary changes in these industries.

This paper aims to provide a complete understanding of

- the various AI technologies being used in the tourism and hospitality industries;
- opportunities in these sectors;
- the challenges in these sectors;
- future possibilities in the tourism, and hospitality.

A comprehensive analysis was conducted in the paper to determine how Artificial Intelligence (AI) is transforming the traditional tourism and hospitality sector into a digital industrial centre.

Application of AI in Tourism Industry: Re-Imagining the Future of Tourism and Hospitality

Artificial Intelligence systems may be used in a variety of ways in the hospitality, travel and tourism industries. AI allows consumers to discover better and more relevant information, increases their mobility, enhances their decision-making, and consequently delivers a better travel and hospitality experience. Artificial Intelligence technologies can be standalone or integrated into current applications and systems. Recommender systems, autonomous agents, conversational systems (chatbots and voice assistants), customization systems and methods, forecasting tools, language translation apps, and smart tourist destinations are all examples of such systems.

Artificial Intelligence has the capability to provide information on a variety of issues, like Destination Tourism Infrastructure, General Infrastructure, Tourist Infrastructure, Hospitality Infrastructure and varied services/resources. AI technology can outperform humans by providing a variety of information on all essential aspects in a matter of minutes related to these sectors.

This information can take the form of interactive messages, self-service technologies, chatbots, audio tours, virtual tours, interactive booking processes, facial recognition technologies, language translations, cross-selling and up-selling, competitive pricing, easy shopping, and so on, all of which are covered in detail in the following sections.
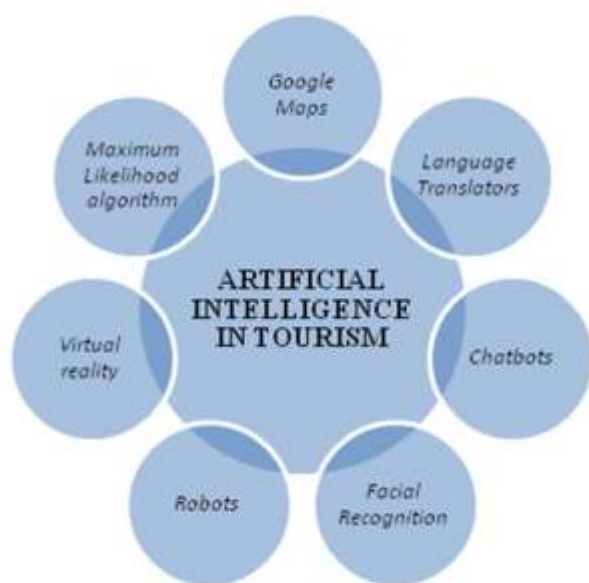

Figure 1:Artificial Intelligence Tools
used in Tourism and Hospitality Sectors.

Figure 2:Artificial Intelligence Tools used
in Tourism and Hospitality Sectors.
Source: (Berger, 2018)https://www.rolandberger.com/en/
Insights/Publications/Innovations-through-AI-in-the-hotel-industry.html

Google Maps

Google Maps' use of Artificial Intelligence technology has enhanced the information sharing by informing passengers about accidents and traffic congestion. Google Maps can now give a live picture of the actual world. In the new function in Google Maps, the camera begins scanning the area for visual landmarks such as buildings, shops, and so on. Google Maps is a wonderful tool for travellers that offer several of the features to make your journeys go more smoothly. Travellers may use the Google Maps programme to determine their precise position and see Google Maps in real-time. The passengers can take the right route without getting lost by using the visual display. One of the advantages of Google Maps is that locations can be saved and synced across all of your devices. This allows the visitors to conduct a pre-travel study of their location so that they can save most of their time. Travellers are aided by Google Maps, which uses GPS technology to keep them updated on instructions. Google Maps' online version serves as a tour guide.

Language Translators

Travel and tourism frequently bring people,who speak different languages, in contact. However, it's been observed that language is one of the most significant barriers that visitors experience when traveling internationally. This problem can be solved if the traveller hires a local guide who is fluent in the local language. Many visitors are prevented from discovering the local culture due to language problems since they stick to franchises and well-known brands when overseas. The development of automatic translation apps and simultaneous translation systems is aided by artificial intelligence-driven by machine learning and natural language processing (NLP). By translating the unfamiliar language into familiar languages, software programmes can take the role of a local guide. Only a few programmes, such as "Google Translate," are capable of doing these functions. Catalogues, brochures, and websites, as well as menus, pamphlets, and signage, are all examples of travel and hospitality related materials. Language has been identified as one of the most serious obstacles to visitors' journey, as well as a source of pain and worry if the content is not written in the familiar

language of the visitors. The software uses the phone camera to scan catalogues, brochures, pamphlets, signboards, and menus and then translates the content on the signboards and menus into the target language.

Chatbots

Chatbots are generally computer software devices that are pre-programmed to respond to common consumer inquiries. Text message-based chatbots and voice-based chatbots are the two primary forms of chatbots. Chatbots that respond to consumers' questions via text messages are known as text message-based chatbots. In voice-based chatbots customers' questions are answered via voice-based messages (Kumar et al., 2018; Kumar et al., 2016). Chatbots have built-in systems that detect the keywords and answer in a single question from the queries raised by the large number of people who answer a single query. The ability to provide numerous replies to a single query in real time has been a standout feature of Chatbots(Samala et al., 2020). Chatbots are available 24 hours a day, 365 days a year which replace the employees. With the help of chatbot the customers may ride the vehicles without a guide as it will describe each location. This technique is known as an audio tour, and it is chosen by visitors who want to go alone with their family and enjoy privacy (Boiano et al., 2019). Chatbots can be used for ordering g meals or drinks, controlling room temperature and lighting, taxi booking and itinerary planning for visiting the sites of their preferred choices, answering critical queries also.

Facial Recognition

Facial recognition technology is a type of biometric artificial intelligence that can identify and verify an individual's identification based on his/ her face with the help of a digital picture or video frame. Facial recognition technology is also being tested and used nowadays in the tourism industry. Facial recognition technology is highly advantageous to speed up the process of identification and verification in tourist industries as they deal with a large number of visitors and customers every day. In the travel industry, facial recognition technology can be used in wide-ranging ways for personalisation, security, data analysis and payments. This technology can also be used to check

the face of the customers, staff and visitors and allows for hassle-free identification, verification and for recording them for future references, whenever required. Several airports have already started using facial recognition technology, which allow passengers to confirm their identification and board flights after standing before a camera for a short period of time. It also helps in eliminating the need for carrying boarding credentials such as immigration, customs, and so on. Tourists can pass through airport verification and all other station check-ins without having their documents verified by various authorities (Chang and Yang, 2008). NEC's (National Electronic Clearing Service) Neo Face Express technology is being utilised for better convenience, security and personalization, in a number of contexts, and is especially beneficial in high-traffic areas.

Robots

A robot is a physical mechanism that incorporates Artificial Intelligence (AI) and perceives its surroundings, allowing it to make decisions and take actions. AI has enabled robots to emerge in service-oriented industries; previously robots were only used in factories. These service robots can overcome many of the drawbacks of humans in tourism, such as language hurdles and staff shortages (Bowen and Morosan 2018). The tourism and hospitality industries are increasingly using AI robots around the globe. Currently, robotic butlers with cognitive capabilities seem unimaginably on the rise. In these industries, the major benefits of service robots, (Concierge Robots) are improving customer experiences, streamlining business processes, and enabling the capacity of human resources to focus on some other operations where robots cannot be used. From customer's personal choices to their smallest of needs, AI-enabled hotel concierge bots can offer minute service and careful assistance. Owing to all these benefits will increase tourism business efficiency (Belanche et al., 2020).

Virtual Reality

Virtual Reality (VR) is generally characterised as a technique that uses a computer-generated 3D environment, sometimes known as a "virtual environment"(Gutierrez et

al., 2008).Visual imagery has been employed extensively in the tourist, hospitality, marketing and promotion areas(Aziz and Zainol, 2011).The intangible characteristics of the tourist industry is a service which reminds marketers that new kind of visual imagery must be introduced on a regular basis in order to establish a good image of the destination (Griffin and Dimanche, 2017). The potential for virtual reality to be used as a preservation strategy, originates from its ability to produce virtual experiences that visitors could accept as replacements for actual visits to vulnerable places. However, a tourist's ideas regarding authenticity, as well as his or her goals and restrictions, will decide whether such alternatives are accepted (Guttentag and Daniel, 2010)."Sensorama Simulator" is an example of VR, which simulates reality with the help of 3D pictures, sounds, vibrations, wind, and simulated motorbike rides around New York City. Theme parks, such as the Dreamworld theme park in Las Vegas, which provides virtual automobile rides, and Cyber Speedway in the city of Las Vegas, are examples of such VR applications in the entertainment world (Gutierrez et al., 2008). VR technology will undoubtedly develop, and boost the prospects of the tourism and hospitality sectors dramatically.

Maximum Likelihood Algorithm

Tourism and hospitality service providers can optimise their services by combining Artificial Intelligence (AI) with the Maximum Likelihood Method(MLM). The ML Mcomputes historical data to predict price likelihood values. This algorithm will advise when prices may rise and when they might fall. As a result, it recommends the most cost-effective time periods to consumers (Kumar et al., 2018; Song and Jiang, 2019). Cross-selling is also boosted by Artificial Intelligence. Cross-selling is a method of promotion in which complimentary products are offered to customers (Bulanov, 2019).

Digital Assistance: Voice-activated Services

Apple's Siri started providing voice-activated assistance to its mobile users to such an extent that it has become almost a norm now. Amazon Echo and Alexa have also joined the race of creating a richer, more delightful customer experience by using the power of machine learning of AI

software. By now Amazon's AI-based software service Alexa is visible in the online store. It is a cloud-based service. The software developers can create customized unique voice-enabled experiences for customers by using AI based software. Alexa's smart program has immense potential to change the future of tourism and hospitality industry with its powerful voice services (Pfeifle, 2018).

Automatic Data Processing (Machine Learning)

By using its data analytics platform that helps the manual staff to create a better profile of its customers, AI is able to capture information about the customer's travel choices, their location preferences and provide customized itinerary purchases, location preferences etc. This information can be translated into providing insightful experience to hotel guests as they travel (Parvez, 2020).

AI Enabled Phones and Mobile Apps

Customers now desire a mixture of high-grade personalization and exceptional serviced standards in tourism and hospitality to save their time and money on the one hand and enjoy the maximum quality services. AI-enabled phones offer amazing features such as, GPS capabilities, gamification and amusement, access to unlimited data and international calls, promotional offers, travel guides, return travel booking services and many more. AI does the real work of a dedicated attendant helping with fast online assistance (Pillai and Sivathanu, 2020). Tourism and hospitality industries are now providing dedicated mobile apps for availing the optimum facilities and amenities with just a click by using their smart mobile phone.

Context Sensitive Customized Services

Al can help create and refine hyper- personalized campaigns to increase revenue and customer retention. It has the potential of re-imaging the future of travel and hospitality sectors by facilitating customized packages as per the needs, budget and convenience of the prospective customers. Customization creates a positive personalised experience for the customers, ensures client satisfaction and helps in retaining them as permanent customers who also helps in carving out a positive image of the

organizations providing products and services. Data on the needs of the customers, their buying behaviours, their likes-dislikes, their level of satisfaction etc. are decoded from personal/professional networks and numerous other sources to create customized packages. However, gathering relevant data from a variety of separate systems and sources and making useful inferences from it is the most difficult and tiring process. AI can help companies to gather predictive data, identify patterns within large volumes of data, and decode the behaviour of customers to promote Frequent Flyer Point (FFP) redemption (Achmad et al.,2018; Davies et al., 2001).

Post Trip- Loyalty & Sentiment Analysis

Customers now prefer to express opinions on various social media platforms. AI technology can be used to figure out which aspects of their loyalty programmes appeal to the clients most and which programmes are deal-breakers. By studying emotional behaviour and sentimental analysis (which uses Natural Language Processing) AI can enable the companies of travel, tourism and hospitality sectors to identify positive, negative, and neutral opinions, and avoid airport over-crowding. Hotels and tourist service businesses can make customised smart videos based on guest recommendations and deliver them to clients to chart and measure their interest in visiting and availing their services and products (González-Rodríguez et al., 2016).

Operations Management

With a large number of passengers, maintaining smooth operations in these sectors will get more difficult and time consuming. Flight turn-around operations would necessitate the use of sophisticated and intelligent systems and technologies to track and anticipate future departure difficulties (Li et al., 2021). Passenger flow may be anticipated using predictive analytics and AI to avoid airport congestion. Based on the present operating environment, as well as past data and patterns, AI may be used to estimate the probability of delayed departures. By understanding common baggage mistreatment and breaking points, circumstances, and surroundings, AI learning skills may be utilised to build a secure and smart virtual assistant to proactively track baggage of the customers (Grover et al., 2020).

Hotel Staff Assistance

Front-desk workers, supervisors, cleaning staff all interact with customers on a personal level. These employees utilise the Point of Sale (PoS) and Property Management System (PMS), which allow AI to take customer services to the next level. The PoS and PMS integration allows for real-time reservation, registration, confirmation and tracking. By tracking spending trends and evaluating visitor preferences, AI can offer real-time solutions and enhance the future prospects of the organization on the one hand and also generate optimum benefits of the workers and customers (Jiang and Wen, 2020).

Lodging Services

AI can be used to include real - time updates into processes. This can assist in evaluating whether or not a guest is satisfied with their amenities and services. Guests may also be given the option of relocating to a different accommodation if they are not satisfied. AI will be able to keep track of luxury scheduled maintenance and staying arrangements (Li et al., 2019).

Virtual Assistant

Approximately 68 percent of airlines and 42 percent of airports and a number of hotels aim to use AI-based intelligent services. These AI-based intelligent services will scan keywords and react with words from the learning database that match them. The system will record, monitor, process and learn every event that occurs around the visitor, including environmental conditions, with the help of a digitally linked expert. An intelligent virtual assistant can engage with the guests and make recommendations for appropriate services, deals, vacation-ideas, suggestions, and alternative options. The virtual assistant will lower the need of call centres by providing hyper-personalized self-service. It will enable the customers an access to any information such as tourist reservations, service status, reputation, room booking, verification, and many more, without requiring a login (Gajdošík and Marciš, 2019).

Back-office Automation and Revenue Accounting

Since AI is capable of identifying buying habits, predicting

associated pricing, and even estimating human resource needs, it will make the back-office work and revenue accounting more time and cost effective. Technology and algorithms can classify bills automatically which otherwise, would have to be performed manually by an accountant.

Opportunities for Artificial Intelligence in Travel, Tourism & Hospitality

The travel, tourism and hospitality industries can make use of the enormous quantity of data provided by AI to make it easier for them to attract new customers and clients. A travel operator or a hotel manager can make better judgments regarding their business strategies through the data analysis. Data analysis can provide them an appropriate methodology/ strategy to efficiently customise the experience of a tourist's/ customer's desires. Using AI in combination with intelligent personalization can yield positive outcomes in the hospitality and tourism sectors. These industries will be able to chart out better plans and activities to offer smart and customized vacation-plans to their customers.

It is more convenient for customers and service providers to use chatbots. It is one of the simplest and cost-effective AI systems. It not only handles tourists' inquiries and feedback, but also streamlines the entire communication process.

Over-the-Air (OTA) are using data-driven recommendation systems to assist visitors to receive recommendations based on their prior searches or reservations. For example, based on the traveller's destination, Google Flights might recommend cheaper travel schedules and airports (Pitti, 2019).

AI has also improved hotel operations in a variety of ways. By giving new tools like robots or voice-activated assistants, it allows the visitors to enjoy more beautiful, unique and memorable experiences. These new tools also save time and money by minimizing inquiries to the customer service desk(Nam et al.,2020).

AI offers visitors with quick and accurate replies; it helps hotels satisfy consumer expectations. With the help of AI, the travel industry may engage with customers interactively anytime and anywhere before and throughout their trip. AI enables for an expansion of the guests' experience to cover the entire journey. Employee happiness is improved by removing them from tedious, recurring and regular duties(Zhou, 2019).

Challenges of adopting Artificial Intelligence

(Laurent et al., 2015) Despite the fact that use of Artificial Intelligence is continuously increasing and improving, its usage among illiterates remains limited. These constraints must be taken into account while using new solutions in combination with evolving technologies and updated policies.

- Whatever domains AI replaces human efforts in, results in the argument of AI replacing Human Intelligence, there are still many unsolved problems in many business domains. But yes, itmay not yet be able to exceed human intelligence because it is still a developing field.

- Despite the fact that chatbots and robots are capable of replacing human workers, clients continue to rely on human workers for complicated questions and queries. Chatbots, for example, are confined to answering simple queries. These systems offer replies based on the keywords in the queries. Customers still rely on human labour when there is an emergency or a complicated issue to be resolved (Lommatzsch, 2018).

- The safety and security of data is another important issue in the usage of AI. Some of the most important industries, such as banking and defence, are facing an ongoing struggle because of AI.

- Chatbots used in hotels keep track of prior purchases and trip information, raising privacy and security concerns. Blockchain technologies in facial recognition software assure data safety and security, certain nations are still hesitant to utilise the technology because of privacy and data security concerns (Kannan and Bernoff, 2019).

- It will be extremely difficult to identify who is accountable in the case of hardware or a software failure. The issue of accountability also needs to be resolved and fixed. Earlier, detecting failure was pretty simple.

- Since AI is based on data, there's a possibility that corporations may try to venture into unknown areas and breach privacy protections. As a result, a travel or hospitality agency's adoption of AI may result in data stealing.

- A key issue with these software-controlled services is that even a minor malware threat can interrupt the software programmes and business functions of the service providers, causing much more devastating effects (Murphy et al., 2017).

- AI technology is so advanced and forward-thinking, it requires huge investment and it is a major challenge for small businesses which cannot afford these AI technologies.

Conclusion

Every situation or object has various dimensions and perceptions. The figure '6' may be perceived as '6' by the person situated on the lower side of the figure, while to the person standing on the opposite/ higher side it may be perceived as '9', yet another person may associate the figure with some imaginary or real objects. So is the case with AI, which has become a topic of heated debates and discussions. The authors have objectively tried to analyse and deliberate on the topic and focused on the present scenario of techno-driven, techno-savvy age.

With the help of AI, the possibilities are endless. With more travellers and customers, it is more important than ever for service providers to stand out by offering highly customised services considering the preferences of their customers. With the emergence of AI, the difficult process of determining visitor preferences and monetizing guest data has progressed. AI is one of the most efficient ways to learn from prior events, increase operational efficiency, and satisfy consumer preferences in time & cost-effective manner. The customer representative or marketing team might recommend items and services based on their knowledge of specific customer preferences. The application of AI in the travel and hospitality industry has far-reaching consequences for improving the end-user experience of customers and allowing for dynamic pricing. The industries can tailor services, evaluate customer feedback, and provide virtual support using AI driven applications and technologies. Intelligent cognitive agents that analyse unstructured data, engage in more human-like interactions, and continually learn are replacing rote, rules-based automated systems like Chatbots. The Travel and Hospitality sector can provide individualised service to its guests by integrating AI with sophisticated analytics concepts, leading to a higher value and memorable experience.

Future Prospects of Artificial Intelligence in Tourism and Hospitality Industry

The future of Artificial Intelligence (AI) in the tourism and hospitality industry is bound to expand and bring a lot of changes in the products, processes and behavioural traits of the users. Society is capable of addressing AI's most important concerns. Workers and AI systems will be able to operate together because privacy problems will be resolved, connection will be provided so that AI systems can be deployed, to enable workers and AI systems to collaborate. In this light AI may be viewed as a collection of technologies that will improve the tourist experience for all parties involved. Businesses will be capable of understanding their consumers and develop goods services, and experiences that are more customized as per their requirements.

In the tourism and hospitality business, there are several paths and areas where AI may be applied to improve services (Bulchand, 2020). Artificial Intelligence technology may turn a hotel room into a popular tourist destination. Customers may choose to turn their whole hotel room into their preferred destination place after entering the room. By choosing this option, the entire area is converted into a virtual 3D environment that closely matches their dream vacation place (Yang et al., 2020). Inside the room, the user may see a 3D image of their dream vacation place. The Visual Positioning System (VPS) may eventually replace the Global Positioning System (GPS). VPS is a cutting-edge technology that puts a live picture of the actual world and visual landmarks in front of travellers. There may be many more untapped and unexpected places in the future linked to service and consumer interactions where AI may be used.

Although facial recognition technologies have been rejected owing to concerns about confidentiality of information, upcoming AI technologies may address these concerns by adding more sophisticated blockchain technologies that ensure data security and privacy.

In the future, we may see Robots escorting hotel visitors to their rooms, carrying their baggage, bringing them meals and refreshments, and providing cleaning services, among other things. Currently, this technology is only employed in a few hotels (Abdelmoaty et al., 2020).

References

- Abdelmoaty, G. A., & Soliman, S. A. E. M. (2020). Smart Technology Applications in Tourism and Hospitality Industry of The New Administrative Capital, Egypt. Journal of Association of Arab Universities for Tourism and Hospitality, 19(2), 102-129.

- Achmad, K. A., Nugroho, L. E., &Diunaedi, A. (2018, August). Context Based-Tourism Recommender System: Towards Tourists' Context-Sensitive Preference Conceptual Model. In 2018 4th International Conference on Science and Technology (ICST) (pp. 1-6). IEEE.

- Alamanda, D. T., Ramdhani, A., Kania, I., Susilawati, W., &Hadi, E. S. (2019). Sentiment analysis using text mining of Indonesia tourism reviews via social media. International Journal of Humanities, Arts and Social Sciences, 5(2), 43-53.

- Azis, N. A., Hikmah, R. M., Tjahja, T. V., & Nugroho, A. S. (2011, December). Evaluation of text-to-speech synthesizer for Indonesian language using semantically unpredictable sentences test: IndoTTS, eSpeak, and google translate TTS. In 2011 International Conference on Advanced Computer Science and Information Systems (pp. 237-242). IEEE.

- Belanche, D., Casaló, L. V., &Flavián, C. (2020). Frontline robots in tourism and hospitality: service enhancement or cost reduction?.Electronic Markets, 1-16.

- Berger, R (2018). "Innovations Through Ai In The Hotel Industry".URL: https://www.rolandberger.com/en/Insights/Publications/Innovations-through-AI-in-the-hotel-industry.html (accessed 18 August 2021).

- Boiano, S., Borda, A., & Gaia, G. (2019). Participatory innovation and prototyping in the cultural sector: a case study. Proceedings of EVA London 2019, 18-26.

- Bowen, J., &Morosan, C. (2018). Beware hospitality industry: the robots are coming. Worldwide Hospitality and Tourism Themes.

- Bulanov, A. (2019). "Benefits of the use of machine learning and AI in the travel industry", available at: https://djangostars.com/blog/benefits-of-the-use-of-machine-learning-and-ai-in-the-travel-industry/ (accessed 15 August 2021).

- BulchandGidumal, J. (2020). Impact of artificial intelligence in travel, tourism and hospitality.

- Chang, H. L., & Yang, C. H. (2008). Do airline self-service check-in kiosks meet the needs of passengers?. Tourism Management, 29(5), 980-993.

- Davies, N., Cheverst, K., Mitchell, K., & Efrat, A. (2001). Using and determining location in a context-sensitive tour guide. Computer, 34(8), 35-41.

- Gajdošík, T., &Marciš, M. (2019, April). Artificial intelligence tools for smart tourism development. In Computer Science On-line Conference (pp. 392-402). Springer, Cham.

- González-Rodríguez, M. R., Martínez-Torres, R., & Toral, S. (2016). Post-visit and pre-visit tourist destination image through eWOM sentiment analysis and perceived helpfulness. International Journal of Contemporary Hospitality Management.

- Griffin, T., & Dimanche, F. (2017). Urban tourism: the growing role of VFR and immigration. Journal of Tourism Futures.

- Grover, P., Kar, A. K., & Dwivedi, Y. K. (2020). Understanding artificial intelligence adoption in operations management: insights from the review of academic literature and social media discussions. Annals of Operations Research, 1-37.

- Gutierrez, M., Vexo, F., &Thalmann, D. (2008). Stepping into virtual reality. Springer Science & Business Media.

- Guttentag, D. A. (2010). Virtual reality: Applications and implications for tourism. Tourism management, 31(5), 637-651.

- Jiang, Y., & Wen, J. (2020). Effects of COVID-19 on hotel marketing and management: a perspective article. International Journal of Contemporary Hospitality Management.

- Kannan, P., &Bernoff, J. (2019). The future of customer service is AI-Human collaboration. MIT Sloan Management Review.

- Kumar, R., Li, A., & Wang, W. (2018). Learning and optimizing through dynamic pricing. Journal of Revenue and Pricing Management, 17(2), 63-77.

- Kumar, V. M., Keerthana, A., Madhumitha, M., Valliammai, S., &Vinithasri, V. (2016). Sanative chatbot for health seekers. International Journal Of Engineering And Computer Science, 5(03), 16022-16025.

- Laurent, P. Chollet, T. and Herzberg, E. (2015). "Intelligent automation entering the business world", available at: www2.deloitte.com/content/dam/Deloitte/lu/Documents/operations/lu-intelligent-automation business-world.pdf (accessed on 15 July 2021).

- · Li, J. J., Bonn, M. A., & Ye, B. H. (2019). Hotel employee's artificial intelligence and robotics awareness and its impact on turnover intention: The moderating roles of perceived organizational support and competitive psychological climate. Tourism Management, 73, 172-181.

- · Li, M., Yin, D., Qiu, H., & Bai, B. (2021). A systematic review of AI technology-based service encounters: Implications for hospitality and tourism operations. International Journal of Hospitality Management, 95, 102930.

- · Lommatzsch, A. (2018, June). A next generation chatbot-framework for the public administration. In International Conference on Innovations for Community Services (pp. 127-141). Springer, Cham.

- · Murphy, J., Hofacker, C., &Gretzel, U. (2017). Dawning of the age of robots in hospitality and tourism:

- Challenges for teaching and research. European Journal of Tourism Research, 15(2017), 104-111.

- Nam, K., Dutt, C. S., Chathoth, P., Daghfous, A., & Khan, M. S. (2020). The adoption of artificial intelligence and robotics in the hotel industry: Prospects and challenges. Electronic Markets, 1-22.

- Parvez, M. O. (2020). Use of machine learning technology for tourist and organizational services: high-tech innovation in the hospitality industry. Journal of Tourism Futures.

- Pfeifle, A. (2018). Alexa, what should we do about privacy: Protecting privacy for users of voice-activated devices. Wash. L. Rev., 93, 421.

- Pillai, R., &Sivathanu, B. (2020). Adoption of AI-based chatbots for hospitality and tourism. International Journal of Contemporary Hospitality Management.

- Pitti, N. (2019). "Challenges & Opportunities In Adopting AI In Travel And Tourism Sector", available at: https://hr.siliconindia.com/viewpoint/ceo-insights/challenges-opportunities-in-adopting-ai-in-travel-and-tourism-sector-nwid-22326.html (accessed 13 August 2021).

- Samala, N., Katkam, B. S., Bellamkonda, R. S., & Rodriguez, R. V. (2020). Impact of AI and robotics in the tourism sector: a critical insight. Journal of tourism futures.

- Song, H., & Jiang, Y. (2019). Dynamic pricing decisions by potential tourists under uncertainty: The effects of tourism advertising. Tourism Economics, 25(2), 213-234.

- Yang, L., Henthorne, T. L., & George, B. (2020). Artificial intelligence and robotics technology in the hospitality industry: Current applications and future trends. Digital transformation in business and society, 211-228.

- Zhou, W. (2019) "The impact of AI on the hospitality industry". URL: https://towardsdatascience.com/the-impact-of-ai-on-the-hospitality-industry-8ba7adb66be (accessed 13 August 2021).