Relevance of Applying Artificial Intelligence in the Tourism and Hospitality Industry

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Abstract: The purpose of the study was to consider the potential and possibilities of using the artificial intelligence technology in the field of tourism and hospitality. The authors analyzed Russian and foreign scientific literature and statistical sources and identified three reasons for using artificial intelligence in the tourism and hospitality industry: improving the quality of service, increasing the income of tourism and hotel enterprises, boosting the profitability of organizations by optimizing costs. Artificial intelligence technologies that can be used in the tourism and hospitality industry enterprises are indicated, with the authors naming the following: face recognition technology, virtual reality technology, chatbots, service robots, Google maps, translation and optimization services. The scientific significance lies in determination of the criteria necessary for artificial intelligence and automated systems to create value for customers, such as: attractive user interfaces, customizability for certain customer segments, functional similarity to other modern platforms. As the problems arising during application of artificial intelligence in the field of tourism and hospitality, the authors single out the following: lack of consistent success in replacing the provision of services in the traditional way with artificial intelligence, data security, high cost for small service providers, customer distrust when communicating with service robots. The authors indicate the need for further research in this area—it is necessary to critically assess the overall importance of the artificial intelligence technology for the tourism and hospitality industry, as well as to identify the possibilities of occurrence of adverse consequences for customers when interacting with the artificial intelligence technologies.

1 INTRODUCTION

Innovative technologies designed to improve efficiency and quality of services provided in the field of hospitality tourism were originally built on the basis of programmed actions with predetermined results. In the last 20 years of the twentieth century, these technologies were based on operational efficiency analysis and revenue management. The pricing of such hospitality services was determined using algorithms controlled by people; as such, new products were often introduced manually and quite rarely. The ability of these technologies to quickly react to actions of competitors or changing market environments was very limited.

Over the past decades, tourism has become one of the largest industries in the world. The increasingly complex relationships between the industry participants, the introduction of new technical standards and the changed needs of travellers call for

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introduction of new technologies in the operation of tourism and hospitality enterprises.

The COVID-19 pandemic has added further new challenges to the already complex tourism and hospitality industry. The customer interaction experience accumulated pre-COVID-19 is no longer relevant to planning and organizing tourism services, and the newly received information has not yet been sufficiently analysed. Such fundamental changes in the hospitality industry are stimulating IT companies to accelerate developments in the field of artificial intelligence (AI).

The travel industry is now at a point where the transactional data need to be processed in real time in order to immediately adapt to the market conditions. Such solutions, built on AI algorithms, will be able to flexibly set prices for services taking into account the actions of competitors and consumer reactions, predict demand, segment groups of customers, and create truly personalized offers for them.

In the age of digitalization, the artificial intelligence (AI) technology is one of the most innovative inventions, and it has revolutionized various industries around the world. Artificial intelligence first appeared in 1956 in John McCarthy's research project in Dartmouth (Mccarthy and Minsky, 2006). Over the following years, AI gained wide application in various areas of human activity, ranging from facial recognition systems and speech processing to use in mobile robotics.

The rapid development of AI began in the 1990s, when advanced and new types of technologies allowed engineers to use large amounts of data, effectively create robots, and utilize increasing computing power. In the 21st century, artificial intelligence has reached its apogee—it can have a profound impact on people, organizations, and industries.

Today, AI technologies are used in a variety of industries—not just information technology (Nagaraj and Singh, 2018-2019) —for example, in self-driving vehicles, robotic nurses, navigation systems, chatbots, and various other fields. Some of the major industries in which artificial intelligence has emerged are the manufacturing and automotive industries, banking and financial services, healthcare, insurance, telecommunications, energy, tourism and hospitality, as well as media and entertainment (Samala and Katkam, 2020).

Every day, the impact of AI is rapidly expanding in an increasing number of industries around the world. In many industries, AI is used in various functions of organizations, such as sales and marketing, customer service, and finance. Thanks to the constant growth of the tourism and hospitality industry, it is considered one of the largest sectors in the world that can affect economic health of nations. In the field of tourism and hospitality, AI is successfully used to gain a competitive advantage.

In the tourism industry, AI is used for a variety of purposes, ranging from increasing the level of personalization of customer services to guaranteeing a quick response even in the absence of employees—it is even used to communicate with customers to improve the quality of services.

The authors of the book “Competing through service: insights from service-dominant logic” (Lusch and Vargo, 2007) argue that technological advances in artificial intelligence can expand the process of cooperation between sellers and buyers of tourism services helping them become more memorable for customers and, at the same time, increasing the competence of companies in providing services, thereby generating value co-creation (VCC) (Chathoth. 2013; Solakis, 2022).

AI offers advanced data processing capabilities, sufficient storage space and ultra-high speeds; for example, hotel businesses started being able to integrate information about their customers and make more accurate predictions about consumer needs (Duan, 2019). At the same time, automation allows machines to perform pre-defined and reprogrammable tasks in the collaboration process, such as personalizing and customizing proposed services based on the transmitted information about customers.

In response to these technological advances, more and more hospitality companies are giving strategic priority to offering unique services using powerful technologies, including artificial intelligence, (Orea-Giner and Muñoz-Mazón, 2022). Accordingly, recently AI has gotten into the field of academic interest among scientists in the field of hospitality and tourism (Fusté-Forné and Ivanov, 2021; Haynes, 2020; Parvez, 2021).

2 MANUSCRIPT PREPARATION

2.1 Materials and Methods

The purpose of this study is to consider the potential and possibilities of using the artificial intelligence technology in the field of tourism and hospitality.

In order to conduct the study, the authors, using the method of analysis of scientific literature, studied an extensive amount of scientific Russian and foreign sources (eighteen total), as well as national and

international statistical sources (five). The literature for the study was selected using the digital service Emerald Insight and the scientific social and collaborative network ResearchGate. The authors carried out an analysis of the scientific literature relevant to the queries "tourism and artificial intelligence" and "hospitality and artificial intelligence". During further study, it was decided to limit the selection of scientific papers with those published no earlier than 2018. Modern researchers on the one hand try to emphasize the need for companies to introduce new technologies, such as AI, to improve the effectiveness of VCC activities (Katsoni and Sheresheva, 2019; Kumova, 2021), and on the other hand, focus on the complexity of introduction of this technology and its adoption by customers (Bolton and Mccoll-Kennedy, 2018; Ruel, 2019). In particular, S. Shebalov (Shebalov, 2009) affirms the inherent benefits of using AI to anticipate customer expectations and personalize unique offerings for them. In turn, R. Bolton and his co-authors (Bolton and Mccoll-Kennedy, 2018), as well as the authors of the work (Ruel, 2019) argue that the prospects for AI as an effective mechanism for value co-creation are still associated with problems of implementation and acceptance by customers.

The main research objectives are:

- identification of the reasons for application of artificial intelligence in the tourism and hospitality industry,
- selection of artificial intelligence technologies that can be used in the operation processes of enterprises in the tourism and hospitality industry,
- definition of the criteria necessary for artificial intelligence to create value for customers,
- indication of problems in application of artificial intelligence in the field of tourism and hospitality.

2.2 Results

Over the past few years, a number of studies have been conducted on the use of AI in the tourism and hospitality industry. For example, during his keynote presentation, Sergey Shebalov, vice president and head of research at Sabre Corporation (Southlake, Texas, US) shared the company's extensive expertise in the field of artificial intelligence and machine learning and described key areas of their application in the tourism industry. According to the expert, these technologies have the potential to radically change the way tourism companies shape their offerings, make decisions, and serve travellers (Shebalov, 2009).

The Libra Hospitality company (Moscow, Russia) presented studies that revealed some important findings useful to companies working in the field of tourism.

A survey conducted by the National Agency of Financial Research (NAFR) (Moscow, Russia) analytical center showed that 85% of suppliers of tourist and hotel services use artificial intelligence in their business. Studies show that this may be due to the rapid growth in sales of digital travel. Researchers also note that 61% of Russian customers plan their tourist trips using the Internet, and make lists of places to visit on their vacations (78%). Other studies show that 85% of customers decide what to do on a trip after arriving at their destination. Thirty-six percent of customers prefer interactive booking processes, and 80% of them prefer self-service technologies to traditional services (Peranzo, 2019). Ninety percent of customers expect up-to-date information about the trip while they travel to their destination. Together, these results indicate the preference of customers to use the Internet and self-service technologies.

Sabre and Google are now partnering to create AI solutions specifically for the travel industry, which are designed to enrich the technological capabilities of all industry participants, airlines, hotels, and travel agencies.

AI technologies are able to help the tourism industry through three avenues at once:

- improve the quality of service through gaining a deeper understanding of the individual needs of guests;
- increase revenues through flexible pricing and calculation of the best price for each client;
- boost business profitability by optimizing costs at each stage of customer service.

The innovation, which the partners called Sabre Travel AI, will allow travel service providers and agencies to create personalized offers for travelers, promote these products in the right channels and monitor the provision of purchased services.

These findings could prompt marketers to use artificial intelligence in the form of interactive and self-service technologies to improve the customer experience. The results of the surveys not only indicate the tendency of customers to prefer self-service technologies over traditional services, but also show the relevance of the introduction of the AI technology.

Modern hospitality clients are very demanding on the timeliness of the services they receive, and there is a tendency to prefer self-service technologies to traditional services. Self-service technologies become largely possible through the use of artificial intelligence.

Important factors influencing the choice of services in the field of tourism and hospitality are natural resources, general infrastructure, and tourism

infrastructure. Artificial intelligence can provide a wide range of information about all of these key factors. AI technology can surpass human capabilities by offering a wide range of information about all key factors in virtually no time. This information can be presented in the shape of interactive messages, chatbots, audio tours, virtual tours, interactive booking process, facial recognition technology, translation services, etc.

Let us consider these possibilities in more detail (See Table 1).

Table 1**:** Application of the artificial intelligence technology in the field of tourism and hospitality.

Name of the AI Technology	Characteristic	Application scope	Advantages
Face recognition	AI technology recognizes the faces of tourists, compares them with the faces in the documents and provides seamless check-in boarding.	Going through a repetitive set of complex and lengthy processes in the form of thorough checks of travel documents by various authorities, such as customs and boarding pass registrations and checks at airports.	The use of AI allows to reduce the time of airport checks, including during transfers, without participating in the verification of documents by various bodies and services, such as the immigration service, passport control, etc.
Virtual Reality (VR) technology	A customer using VR equipment largely perceives the environment in a three-dimensional digital world.	Employees of the marketing services of travel agencies can cooperate with the marketing services of hotels, museums, zoos, etc., in order to provide their client with a virtual journey to a hotel or some tourist destination; for example, the marketing service of Atlantis Dubai Hotels does just that.	Travel managers can showcase travel destinations and hotels using 3D video to bridge the gap between customer expectations and the reality, including helping the customer in making a decision to buy a tour.
Chatbots	A piece of software participating in a discussion through audial or textual methods. There are mainly two types of chatbots, namely, text-based chatbots and voice chatbots. Text-based chatbots provide messaging services for customer requests in the form of text messages. Voice chatbots provide messaging services for customer requests in the form of voice messages. Chatbots have built-in programs, which identify keywords in questions that elicit a certain number of	One of the varieties of chatbots used in tourism is the audio tour technology, which is preferred by travelers who do not want to participate in organized tours with groups. With the help of voice chatbots, they can still acquire high-quality personalized services. Chatbots can facilitate a wide range of services, such as ordering food, hailing taxis, reading messages, scheduling tasks and meetings, setting alarms, calling for room service, cleaning services, informing hotel	Chatbots can be accessed 24/7 all 365 days a year. This key feature makes chatbots a replacement for employees. Chatbots can also store previous guest data with which they can offer recommendations based on their past orders, purchases and actions; thus, they increase the level of hospitality and, consequently, the quality of service.

	answers in response to a particular question.	facilities, etc.	
Robots	These technology-driven assistants use the Internet of Things (IoT) technology to perform simple actions such as turning on the lights in the bedroom, turning off the TV, controlling systems to automatically check in luggage, and receiving guests at the hotel.	Robots began to appear at airports; there they are used as conductors and assistants. For example, the well-known Japanese tourist and hotel company Henn-a Hotel has introduced various types of robots into its workforce, including dinosaur robots. These robots are responsible for manning the reception and receiving guests. Also, robots for registering guests are used by the Marriott network, St. Regis, Westin and Aloft hotels among others, and then there exists the Alexa robot.	Some of the main advantages of robots in the travel industry include improved customer experience, simplified workflow, giving an opportunity for the existing human personnel to focus on other activities, and an increase in the efficiency of the tourism business.
Google Maps including the Visual Positioning System (VPS)	A visual positioning system (VPS) differs from the global positioning system (GPS). The visual positioning system uses artificial intelligence technologies that allow travelers to see the real world and visual landmarks in real time. Google Maps can now use artificial intelligence to display the real world in real time.	A new feature in Google Maps immediately activates the camera and starts scanning around to find visual landmarks like buildings, storefronts, etc.	Travelers can turn on the Google Maps app to determine their exact location and view Google Maps in real time. It will provide detailed information about shops, companies, hotels, shopping malls, cinemas, restaurants, canteens, recreation areas, etc., thereby providing a location-based experience. Using real-time viewing, travelers can head in the right direction without any confusion.
Translation services	There are several software applications capable of translating one language into another. Google Translate provides speech services when a traveler clicks on the "Conversation" option.	This option allows travelers to speak their language, captures their voice message, translates that voice message into the target language (the local language), and dictates the translation into the target language, thereby transmitting the traveler's message to the locals.	This feature is especially useful for illiterate travelers who can't type messages into Google Translate. The best part of this app is its ability to work offline. It can download languages to the app and work offline. Another extremely useful feature is the "Camera Integration" option allowing to read menus in restaurants or shop signs

Optimization services	By using artificial intelligence combined with a maximum likelihood algorithm, service providers can ensure that services are optimized. The maximum likelihood algorithm uses past data and suggests price likelihood values. This algorithm suggests times of price increase and reduction. Therefore, it can report to customers the best timeline in terms of price.	This technology is used in many areas of tourism, such as booking hotels / plane tickets / taxis.	Using this technology, customers can decide whether to book a hotel/flight/taxi or wait until the price drops. Similarly, artificial intelligence helps in cross-selling. Cross-selling is a sales strategy in which additional products are sold to buyers. For example, if a tourist is looking for a taxi service, artificial intelligence can output a pool of offers where there are offers about taxi services, as well as about hotel services, recreation areas nearby, etc. Few online companies such as "Hopper.com" optimize the travel experience, providing information not only about the key service, but also about additional services that complement the key service.

Source: compiled independently on the basis of (Fusté-Forné and Ivanov, 2021; Haynes, 2020; Orea-Giner and Muñoz-Mazón, 2022; Ruel, 2019; Solakis and Katsoni, 2022)

The use of AI technologies can provide tourism and hospitality organizations with a platform to attract customers. In addition, advances in the application of AI technologies offer certain advantages in terms of efficiency, speed, accuracy of forecasts, and consistency in the provision of services to customers. Additional benefits of AI include its ability to offer a wide range of information about key factors, such as natural resources, shared infrastructure, and tourism infrastructure.

In the context of the concept of VCC, artificial intelligence and automation functions are now part of service robots that allow these robots to interact with customers like ordinary employees. One example of such virtual (online) co-creation communities is Starbucks' (Seattle, Vashington, US) "mystarbucksidea.com" and McDonald's (Chicago, Illinois, US) "Make Your Own Burger." In addition, more and more hotel brands are introducing AI-enabled chatbots to facilitate interaction and service to customers in the online environment. These include Chatbotlr and Rose, supported by Marriot Hotel and The Cosmopolitan Hotel of Las Vegas, (US), respectively.

AI used in tourism and hospitality organizations provides efficient storage and retrieval of large amounts of customer data, integrates consumer information, predicts consumer preferences, provides general and personalized information to guests, personalizes guest experiences, receives voice commands, manages facial expressions, and recognizes speech. Customer data can then be used to create a unique and consistent customer experience through automation. For example, information about customer preferences on a previous visit can facilitate meaningful interaction with customers and create a more memorable experience on the next visit.

Further, we will single out the criteria necessary for an automated system equipped with artificial intelligence to create value for customers.

First, the AI medium must have an attractive user interface capable of evoking impressions and emotions. These interfaces can be managed through digital devices such as computers, smartphones, tablets, and other similar devices.

Second, it should be customizable enough to appeal to different user segments.

Third, its use should be similar in functionality to other modern platforms.

These criteria allow AI and automated systems to seamlessly integrate into the service environment, thereby improving the quality of services provided.

Despite the fact that digitalization currently all over the world is almost an imperative, hotel and tourism businesses face a number of problems when introducing AI. The first problem is the need to reduce costs of everything in the postpandemic period, especially those related to introduction of new technologies. Secondly, we can note that the hospitality sphere is deeply rooted in traditions and quite often implies close spiritual contact and individual approach.

We can mention a fact in favor of AI introduction: currently, there is a significant outflow of qualified personnel from the hospitality sphere to other industries. For example, a receptionist earns significantly less than a deliveryman. And deliverymen do not need to spend money on their studies. Therefore, process automation comes to the fore to reduce the number of personnel. A probability of self-service hotels becoming the new reality in the under-four-stars segment is rather high.

Doubtlessly, the introduction of AI into the activities of tourism industry enterprises allows to facilitate higher level of service; meanwhile, the issues of data security may arise. Then, during the collection and analysis of data and large volumes of information about clients, it is necessary to take the topics of information security into account.

2.3 Discussion

The authors of current study agree with the authors of papers (Fusté-Forné and Ivanov, 2021; Kumova, 2021, Orea-Giner and Muñoz-Mazó, 2022; Ruel and Njoku, 2021), which point out that despite the fact that AI boosts tourism and hospitality enterprises' economic efficiency, replacing employees, it also provides customers with a unique experience, unfortunately, not always successful in comparison with that of traditional services. Cases of mutual misunderstanding of customers and service robots with artificial intelligence are not uncommon.

Agreeing with the opinion of N.C. Haynes (Haynes, 2020), we can single out another major concern when using AI, which is data security, especially when using facial recognition technology due to privacy concerns, as well as when storing history of past purchases, travel, etc. in chatbots. The main problem is that a small malware attack can disrupt programs and operations performed by service providers, resulting in significant chaos.

An analysis of the official websites of organizations involved in the supply of artificial intelligence technologies to hospitality and tourism enterprises allows us to agree with the opinion of the authors of works (Haynes, 2020; Katsoni and Sheresheva, 2019; Parvez, 2021) that although artificial intelligence technology is advanced and promising, small service providers cannot afford these technologies as they require huge investments.

In summary, despite the fact that chatbots and service robots can replace human staff, many customers still prefer to rely on humans, especially when it comes to complex queries. A similar opinion was expressed in (Samala and Katkam, 2020; Solakis and Katsoni, 2022) .

3 CONCLUSIONS

Every day the presence of artificial intelligence in all spheres of human life is increasing. However, the use of innovative technologies, such as artificial intelligence, has led to significant changes in employment in tourism and hospitality. As the overall application of AI in the tourism and hospitality industry grows, many jobs may be cut, but at the same time, many new jobs may be created. It is believed that, for example, in the aviation industry accompanying tourism, as well as in the tourism industry itself, there will be a wave of retraining so that the human personnel can adapt to the developing technological infrastructure.

With the introduction of AI, customers of the tourism industry have a higher level of satisfaction. In turn, tourism business enterprises can better control business processes, which will be largely automated, while business operations and some procedures are simplified. Although application of the AI technology will bring many benefits at the industry, organizational, and consumer levels, it can also lead to numerous challenges and complexities. For example, introducing different types of AI into the business context of the tourism industry will not be an easy task. Commercial enterprises will need adequate financial resources to create a safe and reliable technical infrastructure.

The increased use of robots, chatbots, and other artificial intelligence technologies will mean that actual human interaction in the tourism industry will be limited. This can have adverse effects on the consumers of the tourism industry. There may also arise new and complex technical problems that are not yet known. The IT professionals working in the tourism industry should constantly monitor the ease of use of newly introduced technologies, as well as ensure that those are fully useful to all stakeholders.

Such a process can be quite lengthy, since the technology of artificial intelligence is still at its early stage of implementation. More research is needed on

the concept of introducing AI, as well as its application in different types of tourism. Additional research will shed light on the difficulties that may arise for commercial enterprises in the tourism industry due to application of the AI technology. Therefore, it is necessary to conduct a holistic assessment of whether the consequences of employing a new and unique technology will be severe. The concept of artificial intelligence can have a direct impact on the human personnel currently operating in the industry; accordingly, it is necessary to conduct comprehensive studies of AI in tourism so that the overall significance of this technology can be critically assessed. This will help to identify both the positive and negative impact of the technology on the industry, businesses, and customers.

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