

The growing use and impact of artificial intelligence technologies in the tourism industry

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Abstract

The research relevance is determined by the increasing role of artificial intelligence in the tourism business, which was demonstrated during the outbreak of the COVID-19 pandemic in Bali, resulting in a decline in the number of tourists visiting the island. The research aims to investigate the real-life experience of applying artificial intelligence systems in the tourism industry to address the challenges of developing the tourism industry in Bali, Indonesia. The basis of the methodological approach is a combination of theoretical methods of analysis and synthesis of the collected information covering the practical experience of the application of artificial intelligence systems in the tourism industry, as well as a survey of customers of travel agencies that have used such systems in trips to Bali. The research results show that artificial intelligence can significantly help the tourism business in Bali, as the number of tourists visiting the island dropped by 40% during the pandemic, resulting in a reduction in the number of tourism staff. The practical application of systems based on artificial intelligence opens up a wide range of business opportunities, as it allows for optimizing the activities of tourism firms and providing customers with high-quality services with highly technical equipment. The use of neural network mathematical models of tourist firms' activity based on AI, allows them to achieve high speed of data processing, which allows tourist firms numerous competitive advantages and significantly improves the quality of their services. The practical significance of the results of this scientific research lies in the possibility of their application in the organization of the activities of enterprises in the sphere of tourism business, built on the use of digital technologies and systems based on artificial intelligence.

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1. Introduction

Bali province as one of the top tourist destinations in Indonesia has suffered the most economically and human resource-wise, as the number of tourist visits to Bali has plummeted to 82.96% after the COVID-19 pandemic

compared to other provinces in Indonesia. Financial losses of 9.7 trillion Indonesian rupiah monthly (base figures for 2021). Hotels, villas, restaurants and places for tourists to visit were closed during the pandemic, the tourism support sector also could not operate normally, resulting in between 71,313 and 76,313 people losing their jobs or being temporarily laid off or suffering layoffs [1]. Workers return to their places of origin in Bali or to other cities outside Bali. This has happened many times when extraordinary events such as the Bali Island explosions, and the eruption of the Agung volcano, up to the COVID-19 outbreak [2]. The use of artificial intelligence-based (AI) systems to improve the performance of tourism firms that generate consistently high revenues for the Indonesian economy is of high relevance today. This opens up additional opportunities in the area of improving the quality of customer service of travel firms, as well as attracting customers, which is especially relevant in light of the problematic situations described above.

[3] investigated several problematic aspects of building competencies in the hospitality industry using AI-based systems, they noted that a survey of employees at several hotels found that leadership and management skills in AI-based businesses were the most important competencies, followed by industry knowledge and communication skills. According to scholars, hospitality management programs require the development of communication skills and the application of AI systems to improve the efficiency of business processes in general. [4] focused on the fact that the concept of competitiveness of the tourism business enterprise is not always directly related to the efficiency of individual operations. According to scientists, artificial intelligence has a significant impact on improving the efficiency of tourism industry enterprises, because the use of systems based on it allows to significantly intensify the processes of life of organizations of this profile and thus increase their competitiveness in the market of services of this kind. [5] in his scientific study of the general principles of training of tourism business employees using modern digital technologies and artificial intelligence systems notes that AI-based systems are playing an increasingly tangible role in the organization of tourism industry enterprises. According to scientists, the introduction of digitalization processes in the tourism business significantly increases the efficiency of companies in this area, which makes it necessary to train employees of tourism companies to use AI-based systems in their professional activities.

[6] in research aimed at investigating the dynamic capabilities and performance of firms in South Africa draws attention to the fact that the tourism industry and its development directly affects the socio-economic development of many countries and regions. According to the scholar, the future of the hospitality sector is largely determined by the technological innovations that are being introduced, particularly those in the area of modern digital technologies and artificial intelligence systems. [7] in their joint scientific research considered a set of problematic aspects of the practical use of modern information technologies in the activities of enterprises in various business spheres. The scientists note that in the modern business environment, the use of AI systems and digital technologies is of great importance for the successful operation of enterprises. In particular, according to scientists, the use of artificial intelligence in the activities of enterprises in the tourism industry contributes to bringing this area of business to a higher quality level, improving the quality of data preservation and management.

The research aims to study the accumulated experience of the practical application of artificial intelligence-based systems in the activities of enterprises in the tourism industry, to find real prospects for optimizing the activities of tourism and entertainment enterprises in Bali and several other provinces in Indonesia.

2. Research method

The research is based on a combination of the method of interviewing customers of tourist firms and theoretical research of the general principles of application of artificial intelligence systems in the tourism business. The empirical part of the study involved an online survey of travel agency customers who used AI systems when visiting Bali Island during the period from 2020 to the present. The survey included 280 respondents aged between 25 and 55 years old. The surveyed customers travelled to Bali from Australia (105 people, 37.5%), China (98 people, 35% of respondents), Malaysia (57 people, 20.3% of respondents), South Korea (20 people,

7.2% of respondents). The distribution of tourists by gender is – 60% male and 40% female. They were asked questions regarding their attitude to the prospects of using artificial intelligence systems in tourism, based on their practical experience of interaction with these systems, their opinion on the feasibility and direction of application of such systems in the future to improve the quality of customer service of travel companies, as well as the effectiveness of the practical application of such systems to meet the needs of tourists during the journey. This allowed to evaluate the practical effectiveness of the application of artificial intelligence systems in the activities of travel agencies in Bali, as well as the level of assistance of artificial intelligence-based systems to employees of travel agencies in the conduct of business.

The application of the above method of empirical research allowed to objectively assess the data on changes in the dynamics of the volume of visits to Bali by foreign tourists during the period preceding the COVID-19 coronavirus pandemic, immediately during the epidemic and after its completion. This provided the basis for formulating an estimate of the contribution of the tourism industry to the economy of the geographical region under study, which allows to predict the prospects for expanding the range of use of AI-based technologies in the tourism business of Bali and Indonesia as a whole. Consistent application of methods of theoretical analysis and synthesis of the information collected during the research regarding the characteristic features of the practical application of systems based on artificial intelligence in the activities of organizations of the tourism sphere of activity allowed to assess the factors that ensure the presence of competitive advantages of these organizations when using systems based on artificial intelligence. At the same time, it allowed to theoretically formulate competitive advantages of using a neural network mathematical model of the tourist company functioning, which is the main use of numerous systems based on artificial intelligence. A complex, practical combination of the mentioned methods of scientific research allowed to obtain an objective picture of the assessment of the feasibility of the application of technologies based on artificial intelligence to improve the efficiency of the tourism business on the island of Bali and to formulate the possibilities of assisting the systems of artificial intelligence to the tourist worker in the conduct of business.

The combination of the above-mentioned methods of scientific research allowed to consider the general principles of dynamic capabilities theory (DCT) to determine the competitive advantages of tourism companies in the conditions of the modern market, which clearly illustrates the practical advantages of the application of systems based on artificial intelligence in the investigated sphere. At the same time, it created the necessary conditions for an objective consideration of the promising opportunities for the development of tourism 4.0 technologies, which involve the mass use of systems based on artificial intelligence to address a wide range of issues of tourism companies' activities. This was facilitated by the consideration of the main directions of the use of systems based on artificial intelligence in the tourism industry today.

3. Results

Identification and analysis of key trends in the development of employees' competencies in the professional field is essential for the activities of enterprises of different business spheres and the tourism industry in particular. Periodic updating of the competence framework is necessary because the structure of society and the way activities are organized at workplaces will be constantly changing, it is also necessary to update the competence framework that has been developed and implemented over the last few years. In most cases, a revision will be required every three years. At least this is expected by the various professional associations. Revisions may not always be fundamental, but they may occur within a year [8]. The study of competence in narrow professional fields and the tourism sector in particular directly affects a wide range of educational and research issues in a clearly defined professional field.

Meanwhile, DCT, which modern tourism organizations must possess, namely identifying (to find and calibrate opportunities that exist in the market), exploiting (installing artificial intelligence systems so that opportunities available in the market can be exploited) and transforming (reallocating tangible and intangible assets owned so that existing opportunities can always be exploited to achieve a sustainable competitive advantage), is a key

part of the Tourism 4.0 vision [9]. However, given the growing momentum of Industry 4.0 in manufacturing and production, the tourism-specific concept of Tourism 4.0 is now fueling a vision of similar technology-based transformations towards highly interconnected and physical systems in the tourism industry. There is an implicit assumption that the technological innovations of Tourism 4.0 work better for the benefit of tourists. However, even the wonders of tourism information technology often have a serious human-centered design flaw. The unprecedented speed of development and adoption of Tourism 4.0 technology further exacerbates this neglect. At the same time, previously developed and tested approaches to designing the user experience of interactive systems are now facing significant challenges due to the disruption of traditional views of the purpose of system use, the more complex roles of users of a given system, and the dynamic and hybrid context of use. The powerful capabilities of Tourism 4.0 technologies can improve system interactions and enrich the tourism experience itself, providing new ways to assist in behavioral change and even long-term user transformation [10], [11].

Optimized itineraries are suggested to tourists based on their preferences. The effectiveness of using AI in selecting the available offers is determined by the accuracy of the selection of recommendations and the timeliness of their delivery to customers. Assessment of the degree of usefulness of the application of systems based on artificial intelligence on the efficiency of employees of tourism companies should be carried out considering several factors:

- The impact of the professional competence of employees of a travel firm in mastering the latest digital technologies and artificial intelligence systems on the competitiveness of this organization as a whole.
- Determination of the real level of competence of employees of tourist firms in the field of possession of artificial intelligence systems that affect the competitiveness of the company through the professional competence of its employees.
- Objectively analyses the success of interactions with the firm's clients to moderate the relationship between employee competence and professional competence.
- Identifying and analyzing digital competencies that ensure the influence of employees' competencies on the success of solving specific tasks of building the activities of a tourism firm.

The professional competencies of tourism employees in the field of digital technologies and systems based on artificial intelligence give them several competitive advantages in the market. The competences of this kind include:

- Ability to operate databases quickly and efficiently;
- Proficiency in English at a professional level;
- Machine learning;
- Possession of methods of processing and protection of information and databases;
- Skills in dealing with customers quickly and effectively;
- Effective project management skills;
- Skills in managing artificial intelligence-based systems and monitoring their performance;
- Database analysis.

Competences of employees of tourist firms in the field of possession of digital technologies and artificial intelligence systems can be effectively developed practically, in the process of working with these systems in their implementation in the activities of tourist firms. To achieve a high level of professional competence, employees in the tourism industry need the supporting knowledge to fully understand the needs and affections of customers or guests, as well as the ability to use digital equipment in the tourism industry, which makes it mandatory to achieve a high level of digital competence. A competent professional can experience change differently from other ordinary workers, such employees will become more productive, efficient and effective in every task assigned by management so that they can develop, and the competitiveness of the company will increase and bring more revenue to the companies that employ these competent professionals. Not only tourist

satisfaction and financial performance are supporting factors of company competitiveness, but professional competence variables can also be the main support for the competitive advantage of tourism companies.

The tourism industry, like any other industry, needs the application of mathematical modelling methods to optimize the activities of enterprises operating in this field. Building effective and high-quality mathematical models of the activities of tourist forms requires the formalization of knowledge in the field of tourism, which can be achieved through the use of several modern information technologies based on artificial intelligence systems. One of the most effective technologies of artificial intelligence is the neural network and neurocomputer technologies, realized according to the principles of construction and functioning of the human brain [12], [13], [14]. The construction of a neural network mathematical model of the tourist company functioning gives it the following competitive advantages in the context of activity organization:

- Ability to build a model of customers' choice of countries to travel to in specific periods;
- Providing an opportunity to consider a variety of factors affecting the prospect of tourism clients receiving high-quality services when travelling to a particular country on holiday;
- The possibility of increasing the speed of processing data containing decision-making options for specific situations of choosing tourist routes by clients of a travel company.

The introduction of neural network mathematical models based on artificial intelligence in the activities of tourist firms allows the formation of a marketing structure of the activities of organizations of this profile, with many real photos of the main tourist destinations. In this case, the focus is on photographs of the most priority tourist destinations shared by tourists, and a systematic analysis of key aspects of perceived images is performed: compositional scene, visual aesthetic quality, and visual uniqueness [5], [15]. This allows for the subsequent development of a broad set of objective image projection schemes that incorporate several objective parameters of tourist destinations to enhance the overall quality of marketing research.

Nowadays, artificial intelligence is widely used in the tourism business to solve a variety of tasks, mainly related to customer service issues. Chatbots based on artificial intelligence systems are used to provide tourists with round-the-clock service without the involvement of the travel agency staff [16]. Technologies of this kind provide consumers of travel agency services with information about all possible changes in tourist routes, give recommendations following the wishes expressed by customers, and answer questions arising regarding travel conditions, accommodation options, payment for services, etc. Thus, artificial intelligence allows customers to receive more personalized and therefore effective service [12], [17]. For today's realities of the tourism business on the island of Bali (Indonesia), the following directions of the practical application of systems based on artificial intelligence are relevant:

- creating personalized itineraries;
- using augmented reality (AR) and virtual reality (VR) to enhance the overall travelling experience;
- creation and application of modern marketing tools;
- providing real-time translation services;
- increasing accessibility of tourism services for people with disabilities;
- tourism ethics, all tourists should not bother to the Balinese local wisdom.

The creation of personalized itineraries involves the analysis of available information about the client of a travel company (history of previous trips, activity data in social networks, Internet behavior during a given period), after which, through the use of artificial intelligence algorithms, recommendations for specific clients on the choice of certain tourist routes are formed. Such recommendations may consider likely weather conditions, traffic congestion, and a combination of several other factors. The use of AR and VR capabilities involves providing customers of tourism companies with opportunities to explore different parts of the tourist routes and attractions offered to them using interactive educational programs [18], [19], [20]. This allows customers to learn more about the attractions themselves and their associated geographical locations.

Modern marketing tools created based on artificial intelligence technologies allow to optimize the activities of the staff of a travel agency, effectively distribute current tasks between employees and control the timeliness and quality of their performance. In addition, algorithms of this kind make it possible to monitor changes in demand for tourist services and regulate their supply. Artificial intelligence is also very effective in planning the activities of tourism firms, managing the available inventory and avoiding changes in room and ticket bookings [17], [21]. Providing real-time translation services involves integrating special technology into mobile apps that allow travel clients to communicate with locals in their native language. This feature can significantly improve the cultural experience of travelers and simplify the process of communication with locals, resulting in a deeper and more enjoyable travel experience. However, to interact with different streams of travelers in a highly efficient manner, translators need to be proficient in more than just the most common languages. Automated interpreters can manage spoken messages and texts, with optimized interaction on social media and search engines, which involves a dramatic leap from written messages to voice.

Providing accessibility of services of travel agencies to persons with disabilities through artificial intelligence-based systems implies providing them with the opportunity to receive quick assistance through the use of special chat rooms. Customers of tourist companies belonging to this category can quickly get information about the accessibility of hotels, local attractions, and restaurants, as well as the best routes to them. In addition, artificial intelligence can also be successfully applied to develop virtual tours of tourist attractions accessible to people with limited mobility or sensory impairments [17], [22]. Figure 1 shows the graphical dependence of the change in the dynamics of the volume of foreign tourists visiting the island of Bali for the period 2016-2021.

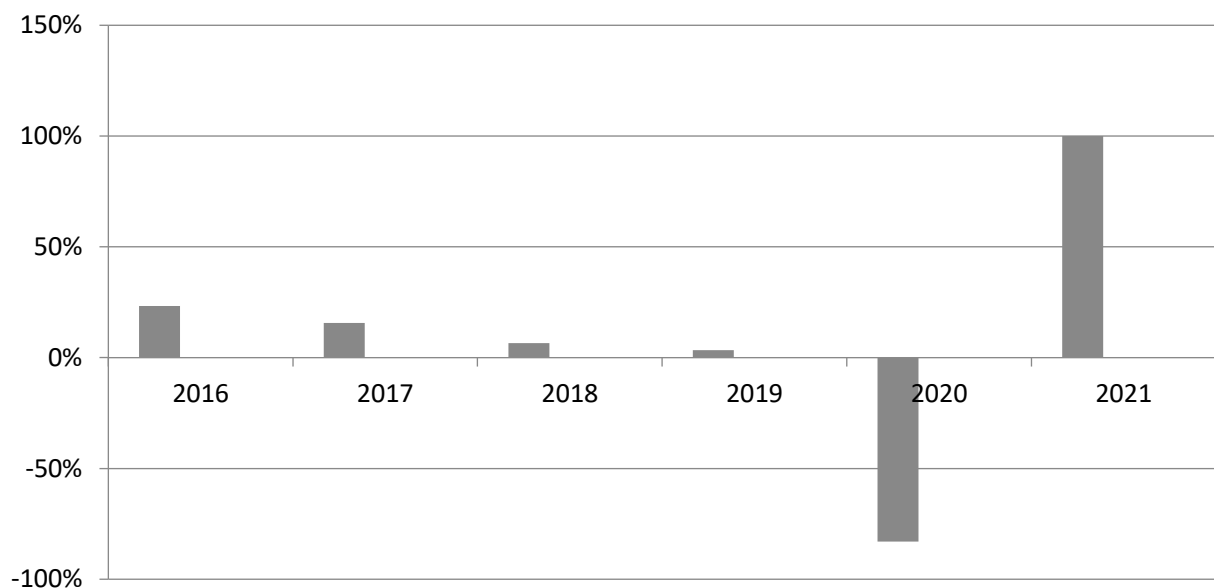


Figure 1. Dynamics of the volume of foreign tourist visits to Bali (Indonesia) [1]

The data presented in Figure 1 shows that in the period leading up to the COVID-19 pandemic, there was a gradual decline in foreign tourist visits to Bali, which peaked in 2020. The sharp rise in the studied indicator in 2021 was largely due to the implementation of artificial intelligence systems in the operations of tourism firms. This allowed them to significantly optimize their activities, which was especially important in the context of mass layoffs in the tourism industry.

The use of systems based on artificial intelligence in the development of the tourism industry of Bali (Indonesia) allows the selection of optimal tourist routes and offering them to tourists. In addition, the application of these systems opens up additional opportunities in the tourism industry. Table 1 summarizes the main benefits of the practical implementation of AI-based systems in running a tourism business on Bali Island (from 2020 to the present).

Table 1. Effectiveness of application of artificial intelligence systems in the tourism business on Bali Island

Used AI systems	Achieved effect
Airline ticket booking automation	Over 80% of clients of travel agencies use the automatic booking system
Chatbots	Significant improvement in the quality of customer service in restaurants and hotels by providing customers with the necessary information on time
Speech recognition	Tourists gained the ability to get answers to questions about cities and hotels, using their smartphone
Virtual reality	Suggesting optimal itineraries to tourists based on their expressed preferences

Based on the concept of the need to evaluate the practical effectiveness of using AI systems in the tourism industry of Bali Island, Indonesia, an online survey was conducted on 280 travel agency customers who used AI services when visiting Bali from 2020 to the present. The results of the survey are summarized in Figure 2.

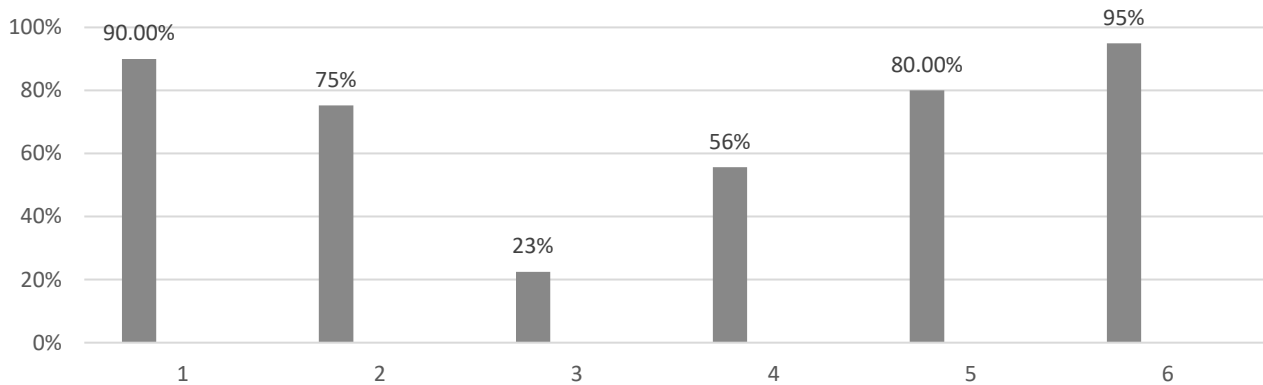


Figure 2. Results of the survey of clients of travel agencies in graphical representation

Figure 2 displays the following data:

- Number of customers who are positive about the use of AI systems in tourism in the future (252 people, 90% of respondents).
- Number of customers satisfied with their personal experience with AI (211 people, 75.3% of respondents)
- Number of customers who are confident that AI systems are storing their personal information (63 people, 22.5% of respondents).
- Number of customers who believe that travel companies implement AI systems based on consideration of their interests (156 people, 55.7% of respondents).
- Number of customers who believe that travel companies implement AI systems based on consideration of personal interests (224 people, 80% of respondents).
- Number of customers who have been helped by AI systems to solve their problems (266 people, 95% of respondents).

Thus, according to the results of the survey, the vast majority of tourism customers who used AI systems during their visit to Bali were able to effectively resolve their current issues through these systems (95%). The vast majority of respondents (90%) are positive about the prospects of using these systems in the future. More than 75% of the respondents are satisfied with their personal experience of using AI systems when visiting Bali Island. This shows the effectiveness of using AI systems in the tourism industry and that they can significantly assist tourism workers in conducting business. At the same time, the effectiveness of the practical application of technologies based on artificial intelligence is achieved by achieving a sufficient level of professional competence in the use of such systems by employees of travel agencies. For this purpose, it is necessary to

consistently introduce this kind of technology in the practical sphere of activity of travel agencies with the subsequent analysis of their effectiveness in solving specific tasks to meet the needs of customers and improve the quality of their service.

4. Discussion

In a joint research study by [23], [24], [25] the issues of the relationship between the factors that determine the competitiveness of an enterprise in the tourism industry in the context of the realities of modern tourism business were considered. In the joint scientific study of the researchers, the issues of the interrelation of factors determining the competitiveness of the enterprise belonging to the tourism industry in the context of the realities of the modern tourism business were considered. Scientists note that today there is a scientific division of approaches to the study of the prerequisites for determining the competitiveness of enterprises of different business spheres. According to scientists, enterprise resources, the ability to allocate them competently, manage them and direct them to the solution of the main technological tasks, together constitute the main prerequisites for optimizing the activities of enterprises in various spheres of modern business. The researchers' opinion is confirmed by the results that were obtained during the implementation of this research work. In particular, it concerns the issues of resource allocation of tourism enterprises when organizing their activities using AI-based systems, as well as in the case of reducing the number of employees and redirecting their duties to AI-based systems [26], [27].

[28], [29] considered several problematic aspects of the impact of systems based on artificial intelligence on the activities of tourism firms, in the context of creating a modified approach to structural modelling of the success of the functioning of this kind of enterprise. According to scientists, the emergence of new, global markets in several developing countries necessitates the need for travel firms to adopt new concepts to improve their competitiveness. In this context, the future of the entertainment and tourism industry is directly linked to the use of artificial intelligence systems as a factor that provides an increase in the competitiveness of these enterprises in the market in the context of the pronounced effects of the COVID-19 coronavirus pandemic [28], [30], [31]. The scientists' conclusions are fully consistent with the results of this scientific work, in particular, in the context of assessing the significance of the practical application of systems based on artificial intelligence in business management in the post-COVID era, during the period of mass layoffs of employees of travel firms.

For their part, [32], [33] conducted a joint scientific study of the general principles of interaction with tourism brands within the framework of the concept of optimizing the activities of enterprises in this industry in the context of the introduction of artificial intelligence systems. The scientists note that the issue of searching for a new concept of interaction with customers in the tourism sector using modern technological advances is becoming increasingly important in terms of finding opportunities to optimize their activities. Researchers have concluded that artificial intelligence opens new, unprecedented opportunities for enterprises in the tourism sector, as it significantly intensifies the processes of life of enterprises in this industry. The conclusions of scientists are fully supported by the results of this research work, as they reflect the possibilities of applying artificial intelligence in the tourism business.

At the same time, [34], [35], [36], [37] conducted a joint scientific study of the changes in the dynamic management capabilities and organizational performance of enterprises in the tourism sector, in the context of the introduction of new, more modern, technological methods of managing the activities of this type of enterprises. The authors concluded that the role of artificial intelligence systems in managing the activities of organizations is to ensure their high efficiency in solving key problems related to the accounting, management and optimization of actions aimed at solving the key tasks facing the tourism organization and related to attracting new customers and improving the quality of their services. The findings of the scientists are fully supported by the data that were obtained in this research work, as they emphasize the high efficiency of AI-based systems when implemented in the tourism business, to improve the management of the enterprise and attract new customers.

[38], [39] examined the prospects for improving the efficiency of tourism organizations in remote working in the period after the COVID-19 pandemic. The researchers noted that the use of AI-based systems holds significant promise for the tourism industry in the post-COVID-19 period, given the massive layoffs in the travel industry. According to the researchers, as the capabilities of digital technologies and AI systems expand, there will be sufficient flexibility in the functioning of tourism enterprises by redirecting the functions of remote workers in this sector of the economy. The opinion of scientists is fully consistent with the results that were obtained during the implementation of this research work, because they clearly illustrate the importance of expanding the range of applications of technologies based on artificial intelligence in the tourism business, for their successful functioning in remote mode, as well as considering the large-scale job losses in the tourism business during the pandemic.

[40], [41] considered several problematic aspects of building customer relationships in the modern business environment. The scientists concluded that today many companies operating in a wide variety of business spheres emphasize improving the quality of customer relations, building their policy focused on customer satisfaction. In this context, gaining significant competitive advantages becomes possible by improving the quality of services provided, which is facilitated by the use of modern digital technologies and systems based on artificial intelligence [42], [43], [44], [45]. The researchers' conclusions are supported by the data that were obtained in this research study, as they clearly illustrate the relationship between the application of technologies based on artificial intelligence and competitive advantages for tourism businesses.

[46] addressed a set of problematic aspects of the formation of managerial competencies in the tourism business among students of several higher education institutions in Australia in their joint research work. In the framework of the conducted scientific research, the scientists formulated the opinion that the training of modern specialists in the field of tourism should be carried out considering all the variety of technological changes in the activities of organizations of this profile [47], [48]. The researchers conclude that the development of competencies of future and present specialists in tourism is largely determined by their ability to manage the available technologies based on artificial intelligence, which are introduced into the activities of tourism enterprises at all levels of their functioning. These conclusions are in line with the results of the presented scientific work, in the context of assessing the role of artificial intelligence technologies at various levels of activities of tourism enterprises, which is particularly relevant in the post-COVID-19 period.

[49], [50], [51], [52] conducted a joint scientific study of a wide range of problematic aspects of the application of information and communication technologies and technological innovations based on artificial intelligence in the training of future specialists in the tourism industry. According to the scientists, the training of specialists in the tourism industry, at the proper level of knowledge of systems based on artificial intelligence and information and communication technologies, has repeatedly changed due to changes in these industries [53]. The tourism industry needs major innovations involving the implementation of state-of-the-art AI-based systems that can qualitatively improve information processing activities [54], [55], [56]. The opinion expressed by the scientists is confirmed by the results of this scientific work, in the context of evaluating the role and importance of artificial intelligence systems in the organization of information processing activities in the tourism sector.

[57], [58], [59] conducted a joint scientific study of the general principles of the application of digital technologies and artificial intelligence-based systems in the training of tourism workers and their subsequent activities. The researchers conclude that continuous technological progress poses new challenges for employees in various areas of modern business. In particular, the introduction of systems based on artificial intelligence in the activities of tourism firms makes it necessary to increase the general level of technical literacy of their staff, which, in turn, determines the nature of the organization of training of tourism workers in the use of artificial intelligence systems in their professional activities [60], [61], [62], [63]. The opinion expressed by the scientists is fully supported by the results of this scientific study, as it emphasizes the importance of improving the

technical literacy of employees of tourism firms for their successful operation using artificial intelligence systems, which is particularly relevant during the mass layoffs in the industry during the pandemic [64], [65].

Thus, the discussion of the research results in the context of their analytical comparison with the results and conclusions of other researchers who have studied various aspects of the practical application of systems based on artificial intelligence in the tourism business demonstrates their coincidence in several key aspects.

5. Conclusions

The research has established that artificial intelligence-based systems can provide significant assistance to the employees of tourism firms in conducting business. In the realities of the hotel and restaurant business on the island of Bali, the use of systems based on artificial intelligence helps to optimize the provision of services to tourist firms, in particular: it allows the development and implementation of personalized itineraries based on the identified individual preferences of customers; to use the possibilities of AR and VR technologies in the practice of travel companies to improve the customers' experience of travelling; to create and use modern marketing tools that optimize the activities of tourism firms; provide real-time translation services to facilitate communication between tourists and locals; significantly improve accessibility of tourism services to persons with disabilities. This shows the wide possibilities of artificial intelligence in the tourism business and the prospects of its application to assist employees of tourism firms in their professional activities.

Application of systems based on artificial intelligence allows to optimize the activities of firms in the hospitality industry in Bali, significantly improving the quality of their services. In turn, this allows to increase in the flow of revenues to the Indonesian budget from the activities of these firms, which positively affects the economic situation in the state as a whole. Thus, artificial intelligence can significantly help the tourist worker in business, providing him with a wide range of opportunities, through the use of the high efficiency of business and improving the range and quality of services provided by travel agencies. Prospects for further scientific research in the direction defined by the subject of this research are conditioned by the expansion of the range of applications of artificial intelligence systems in the tourism business and the associated need to study the full range of problematic aspects of the application of systems based on artificial intelligence by employees of the specified sphere of business.

Declaration of competing interest

The authors declare that they have no known financial or non-financial competing interests in any material discussed in this paper.

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Author contribution

The contribution to the paper is as follows: A. Indaryanto: study conception and design; B. Dwi Harijad: data collection; A. Indaryanto and E. Sinaga: analysis and interpretation of results; B. Dwi Harijad: draft preparation. All authors approved the final version of the manuscript.

Abbreviations and acronyms

AI	Artificial Intelligence
DCT	Dynamic Capabilities Theory
AR	Augmented Reality
VR	Virtual Reality

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