

## Artificial intelligence in the hotel industry in Slovakia

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**Abstract:** Artificial intelligence in the hotel industry streamlines processes, personalizes services, enhances customer service, and analyzes data. It helps reduce costs, increase security, and improve competitiveness. In the current technology-driven era, it is essential for efficient operations and customer satisfaction. The main goal of the presented article is to explore and analyze the application of artificial intelligence in the hotel industry and map the effects it brings to hotels and other accommodation facilities in Slovakia. Using a sociological survey method in the form of a questionnaire, this article analyzes the extent of artificial intelligence technology implementation in accommodation facilities in Slovakia and the effects it brings. Based on the results of our primary research, we can conclude that artificial intelligence is not widely adopted in the Slovak hotel industry to its full potential, considering its possibilities and utilization in various operational areas of accommodation facilities.

**Keywords:** artificial intelligence, technologies, hotel industry, accommodation facility, Slovakia

**JEL classification:** L83, O32, Z32

## Veštačka inteligencija u hotelskoj industriji u Slovačkoj

**Sažetak:** Veštačka inteligencija u hotelskoj industriji pojednostavljuje procese, personalizuje usluge, poboljšava korisničku uslugu i analizira podatke. Pomaže u smanjenju troškova, povećanju sigurnosti i poboljšanju konkurentnosti. U trenutnoj eri vođenoj tehnologijom, veštačka inteligencija je od esencijalnog značaja za efikasno poslovanje i zadovoljstvo kupaca. Osnovni cilj predstavljenog članka je istraživanje i analiza primene veštačke inteligencije u hotelijerstvu i mapiranje efekata koje ima na hotele i druge smeštajne objekte u Slovačkoj. Koristeći metod sociološkog istraživanja u formi upitnika, ovaj članak analizira stepen primene tehnologije veštačke inteligencije u smeštajnim objektima u Slovačkoj i efekte koje ona donosi. Na osnovu rezultata primarnog istraživanja može se zaključiti da veštačka inteligencija nije široko prihvaćena u slovačkom hotelijerstvu u svom punom potencijalu, s obzirom na njene mogućnosti i primenu u različitim operativnim oblastima smeštajnih objekata.

**Ključne reči:** veštačka inteligencija, tehnologije, hotelska industrija, smeštajni objekti, Slovačka

**JEL klasifikacija:** L83, O32, Z32

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## **1. Introduction**

Over the past few years, the field of artificial intelligence and its applications have continuously evolved. Thanks to advancements, particularly in simulating human thinking and the continuous learning processes of artificial intelligence devices, artificial intelligence is no longer limited to personal use but has also found its place in the business sector across all branches of the national economy.

The fact that information can be stored, retrieved, and conclusions drawn from it through suitable programs makes artificial intelligence particularly intriguing for the hotel industry. The hotel industry, which gathers vast amounts of data in various forms, benefits from artificial intelligence and automation, offering businesses in the travel industry numerous opportunities to enhance their daily operations and provide high-quality services to their customers (Koo et al., 2021). Depending on the accommodation facility or provider, individual solutions can be employed here, such as reservation options, room service management, guest wake-up services, personalized advice based on previous reservations and requests, as well as various accounting tasks of accommodation facilities (Smrutirekha Sahoo & Jha, 2022).

Operators and employees of accommodation facilities must understand the latest trends in artificial intelligence, as they can significantly impact how they work and serve their guests. Artificial intelligence can automate repetitive tasks, allowing hotel staff to focus on more strategic activities, such as building relationships with key customers and delivering personalized services to guests. Predictive analytics can help hospitality professionals analyze data and predict customer behavior and market trends, enabling them to make data-driven decisions and develop more efficient marketing strategies. AI-powered personalization and recommendation tools can provide individual guests with more targeted and tailored experiences based on their preferences, past behavior, and demographic information. Chatbots and virtual assistants using artificial intelligence allow hotel staff to communicate with guests in real-time and provide personalized recommendations and assistance. Artificial intelligence can also be used to monitor and predict room maintenance needs, optimize pricing and inventory decisions, forecast demand, and adjust room availability accordingly, optimize energy efficiency, and reduce hotel management and operation costs. Understanding these trends can help hotel professionals stay competitive and better serve their guests (Bhaskar & Sharma, 2022; Kaur & Chauhan, 2023; Rawal et al, 2023).

For this reason, the presented article should provide answers to the defined research questions: What artificial intelligence technologies can be used in accommodation facilities? What are the advantages and disadvantages of implementing artificial intelligence technologies in accommodation facilities? What artificial intelligence technologies are used in accommodation facilities in Slovakia?

## **2. Theoretical background**

Artificial intelligence has existed for centuries, with references even found in Greek mythology to human-like machines that mimicked human behavior. The journey of artificial intelligence, as we know it today, began in the 1950s when computing technology was a fraction of what it is today. Artificial intelligence started with generating predictions through programs using available statistics. The initial development of artificial intelligence relied mainly on statistical techniques. The evolution of present-day artificial intelligence applications started with the use of traditional statistical techniques, which were successfully employed in the development of so-called artificial intelligence programs. These programs

are referred to as the “so-called” because the artificial intelligence programs utilized today are much more complex and employ techniques far beyond the statistical methods used by earlier artificial intelligence programs (Tandon et al., 2019).

For the hotel industry and the accommodation facilities themselves, a key position in the competitive market is related to the constant improvement of business processes and active interaction and fulfillment of the needs of their customers. This also includes improving conditions for its employees. In the hotel industry, employees often face difficult working conditions and are often paid less compared to the demands of their work. This situation creates a negative image of work in accommodation facilities and leads to a high turnover of employees, which in turn does not contribute to a positive evaluation of services by customers and their overall satisfaction with the services they receive. Another challenge facing the hotel industry is the growing cultural change. This change reflects the fact that today’s customers are more demanding, with a richer traveling experience, and therefore expect a higher level of service to maintain memorable experiences. Accommodation service providers are therefore forced to transform their strategies using new technologies to keep up with modern trends (Jayawardena et al., 2013). Integrating these technologies into their business requires not only investment in property and training, but also the ability to attract new potential customers willing to use the new products. Thanks to innovative technologies such as artificial intelligence, it is possible to improve the quality of services provided and ensure greater customer satisfaction. In this way, accommodation facilities can compete and increase their income (Miguéis & Nóvoa, 2016).

From the available literary sources, it is evident that artificial intelligence plays a crucial role in the hotel industry from various aspects:

- Robotic technologies are the most common applications of artificial intelligence in the tourism sector, including the world’s first robot hotel, Henn-na in Japan (Lewis-Kraus, 2016), humanoid robots serving as receptionists (Chestler, 2016; Davis, 2016), robotic bartenders (Tussyadiah, 2020), robotic chefs (Troitino, 2018), or robotic waiters (Ivanov & Webster, 2019).
- Biometric technologies are based on utilizing physical characteristics of individuals, such as eyes, iris, fingerprints, face, hand geometry, and voice (Ivanov & Webster, 2019). According to The Business Research Company (2023), the facial recognition technology market is projected to grow from USD 5.43 billion in 2022 to USD 6.28 billion in 2023.
- Software program – Chatbot, enables users/consumers to communicate with the system in their native language (Shawar & Atwell, 2007). Phaneuf (2020) mentions that Marriott International allows its guests to make reservations at any of its 4,700 hotels through a chatbot on the Facebook Messenger platform.

Ivanov and Webster (2019) state that in the field of travel, tourism, and the hotel industry, robotic technologies, artificial intelligence, and service automation are being globally applied, although the success rate of implementing these technologies varies across different tourism sub-sectors. Currently, there are several studies and publications addressing the application of artificial intelligence in accommodation facilities and evaluating its effectiveness or ineffectiveness. For example, the authorial team of Štilić et al. (2023) contributes to the growing body of literature on the use of artificial intelligence through case studies of hotels belonging to leading hotel companies such as Marriott International, Hilton Worldwide, and InterContinental Hotels Group. Sharma and Rawal (2021) evaluate the impact and role of artificial intelligence technologies in improving the quality of services provided by accommodation facilities, expanding on the study by Nam et al. (2020), who conducted an in-depth survey of factors influencing the implementation of artificial

intelligence and robotics technologies in a sample of selected hotels in Dubai. The issue of artificial intelligence and its application in the hotel industry is not adequately represented in the conditions of the Slovak Republic compared to other European or global countries. Currently, there is no study mapping its implementation using Slovak accommodation facilities as an example.

The implementation of artificial intelligence carries risks such as the loss of jobs with low levels of technology, increased autonomy of robots that can lead to a loss of control, and serious concerns about safety, privacy protection, and related risks (Tussyadiah, 2020). Furthermore, some businesses in the tourism and hotel industry are concerned about the risks and security implications of implementing artificial intelligence and robotics, given their accessibility and consistency (Lu et al., 2020). The increase in leisure time resulting from automated travel facilitation has the potential to further boost the demand for travel, which can contribute to issues such as overtourism and overall stress on destination ecosystems (Tussyadiah, 2020). These are risks associated with advancements in artificial intelligence that need to be considered when implementing it, including in the hotel industry.

### 3. Materials and methods

The main goal of the presented article is to explore and analyze the application of artificial intelligence in the hotel industry and map the effects it brings to hotels and other accommodation facilities in Slovakia.

The article aims to identify specific areas where artificial intelligence technologies can be applied, such as personalized recommendations, chatbots, automated reservations, smart rooms, and human resource management. Another partial goal is to evaluate the advantages, disadvantages, and challenges associated with the application of artificial intelligence in the hotel industry, as well as assess its impact on operational efficiency and financial performance.

The results of this study are expected to provide practical recommendations for accommodation facility operators and managers when making decisions regarding the implementation and optimization of artificial intelligence within their businesses.

In direct link to the main goal set out above, the following key research questions (RQ) have been formulated:

**RQ1:** *What artificial intelligence technologies are used in accommodation facilities in Slovakia?*

**RQ2:** *What are the advantages and disadvantages of implementing artificial intelligence technologies in accommodation facilities?*

The analysis was conducted based on primary sources obtained through a sociological survey using a questionnaire. The questionnaire consisted of 16 questions, which were closed-ended, open-ended, and scaled questions, and were thematically divided into three sections. The first part consisted of questions that allowed for a general characterization of the surveyed accommodation facilities. The second part examined the application of artificial intelligence technologies, the reasons, advantages, and disadvantages associated with their implementation. The third part focused on the impact of artificial intelligence technologies on the efficiency of the accommodation facility and its financial performance. A total of 350 accommodation facilities of all categories and classes were contacted, based on the original categorization of accommodation facilities according to the Decree of the Ministry of Economy of the Slovak Republic No. 277/2008, which establishes classification features for

accommodation facilities when classifying them into categories and classes. The decree lost its validity in February 2021.

To interpret the obtained and sorted results, we used the graphical method, which involved organizing the data into graphs and tables. In the final part of the presented article, we addressed the research questions that were formulated using the deductive method.

#### 4. Results and discussion

Considering the nature of the research problem being addressed in the presented article, we have selected only the most relevant questions from the questionnaire to fulfil the main objective. These selected questions will be presented in the following section.

The questionnaire was distributed online by reaching out to respondents via e-mail, during the period of February to May 2023. The questionnaire was completed by 235 respondents, which represented 67.14 % of the total contacted sample. Table 1 presents the profile of the respondents who took part in the questionnaire research.

Table 1: Profile of respondents – category and class of surveyed accommodation facilities

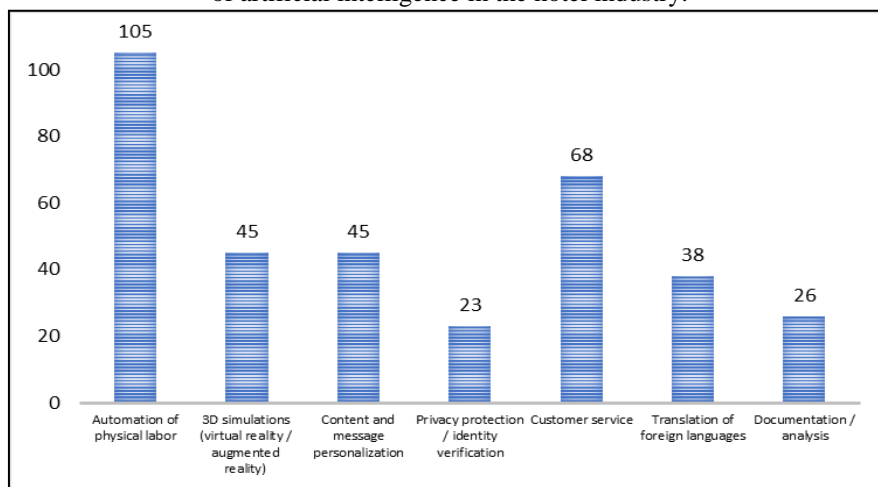
		<b>Number (n = 235)</b>	<b>% of number</b>
<b>category of accommodation facility</b>	hotel	159	67.66 %
	motel	3	1.28 %
	guesthouse	33	14.04 %
	apartment house	28	11.91 %
	tourist hostel	12	5.11 %
<b>class of accommodation facility</b>	*	12	5.11 %
	**	60	25.53 %
	***	104	44.26 %
	****	51	21.70 %
	*****	8	3.40 %

Source: Author's research, 2023

From Table 1, it is evident that the largest proportion of respondents in terms of the category of accommodation facilities were hotels (159, i.e. 67.66%). The second largest representation was from guesthouses (33, i.e. 14.04%), followed by apartment houses (28, i.e. 11.91%). When examining the second parameter, the class of accommodation facilities, the majority of respondents were from three-star accommodation facilities (104, i.e. 44.26%). On the other hand, the least representation was from five-star accommodation facilities – hotels (8, i.e. 3.40%). In the questionnaire survey, we did not specifically investigate the size of accommodation facilities in terms of the number of employees. We believe that artificial intelligence is utilized in various types of accommodation facilities regardless of their size. The adoption of artificial intelligence in accommodation facilities depends more on their goals, technological development, and investment opportunities. Larger accommodation facilities, such as hotels, often have greater financial resources for the implementation and development of artificial intelligence technologies. However, even smaller accommodation facilities, such as guesthouses, apartment houses, and tourist hostels, can leverage artificial intelligence to improve their operations and service delivery. In these cases, low-budget technologies, such as the implementation of chatbots and automation of reservation processes, may be more commonly utilized.

In the introduction of the questionnaire survey, we were interested in assessing the level of knowledge and awareness of the respondents regarding the use of artificial intelligence technologies in the hotel services market in Slovakia, as well as abroad, and their understanding of artificial intelligence. Figure 1 presents the responses of the respondents to the question regarding their perception of the term “artificial intelligence in the hotel industry”.

Figure 1: Knowledge of operators/managers of accommodation facilities about the concept of artificial intelligence in the hotel industry.



Source: Author’s research, 2023

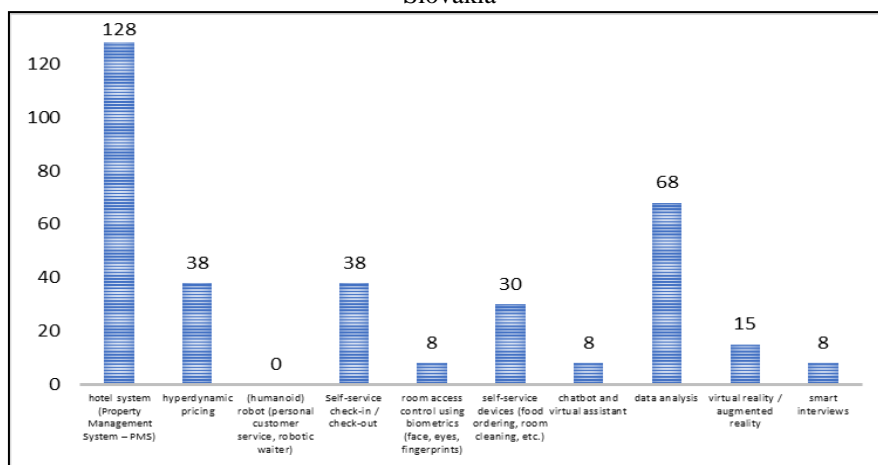
The respondents had the opportunity to select multiple answers. As we can see, respondents mostly associate artificial intelligence with process automation, which involves replacing human employees with robotic technologies (such as receptionists, bartenders, waiters, housekeeping, etc.). In this case, it reflects a lack of knowledge among operators or managers of accommodation facilities, as artificial intelligence technologies applicable in the hotel industry can include: AI-powered chatbot programs that allow interaction with guests through chat interfaces, answering questions, providing reservation information, and offering recommendations to potential customers; programs focused on analyzing vast amounts of data using algorithms and machine learning to predict room demand, prices, and trends; programs focused on ensuring guest privacy and security, such as identity verification systems based on biometric data like facial recognition or fingerprint scanning; technologies that assist in automating and optimizing inventory and supply chain management processes in accommodation facilities, leading to more efficient operations and reduced potential losses; and software solutions aimed at automating various hotel processes such as reservation management, guest check-in and check-out, billing, and more.

This lack of knowledge can have several reasons. The first reason is a lack of information and education about artificial intelligence and its applications in the hotel industry. This is evident from the question we asked the respondents – What is your knowledge of the use of artificial intelligence technologies in the hotel services market in Slovakia and abroad? The result was that a total of 176 respondents (75% of the total) answered that their knowledge is at a good to insufficient level. Many operators or managers do not have access to relevant information or do not have the time and resources to dedicate to in-depth study of this field. Some operators or managers are concerned that implementing artificial intelligence can be financially demanding or challenging to implement, and they believe that its implementation

would require changing work procedures and processes, which can lead to uncertainty and resistance to change. Another factor is the lack of visible examples of successful use of artificial intelligence in the hotel industry. Many operators or managers find it difficult to identify specific examples and cannot envision how this technology could impact their specific operations and improve results.

In the next question, we focused on the use of artificial intelligence technologies in accommodation facilities, giving respondents multiple options to choose from. The responses to this question are presented in Figure 2.

Figure 2: Implemented artificial intelligence technologies in accommodation facilities in Slovakia

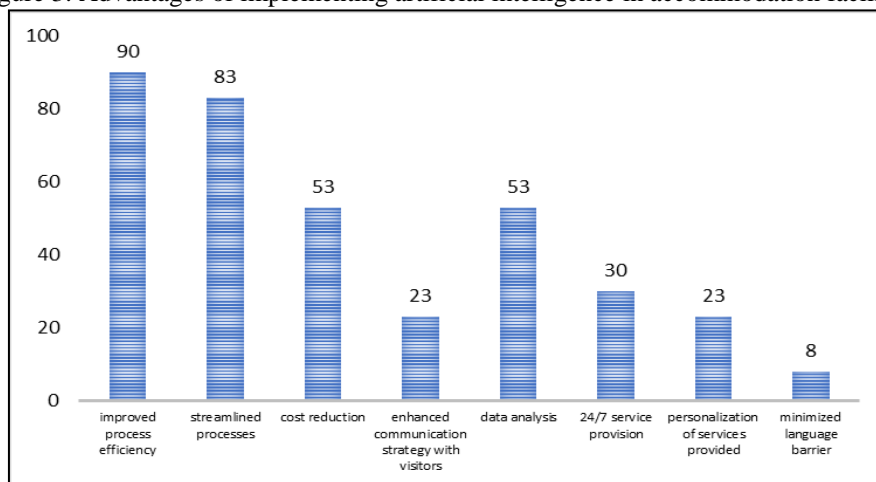


Source: Author's research, 2023

We can see that the most commonly used artificial intelligence technologies in the hotel industry in Slovakia are the application of Property Management Systems (PMS), which are used for the automation and centralization of hotel operations management, such as reservations, guest management, billing, and inventory management. In terms of data analysis, artificial intelligence helps in analyzing large amounts of data from various sources, such as customer preferences, reviews, and demand forecasting. This information helps accommodation facility operators and managers better understand their customers and optimize their business operations. On the other hand, we observe that humanoid robots are not widely adopted in the Slovak hotel industry. This finding is supported by the additional question responses, where respondents indicated that the purchase and maintenance of humanoid robots are financially demanding, humanoid robots pose various technical challenges that may lead to unsatisfied customer demands or create a negative impression of the hotel experience, and customers value personal contact with hotel staff. Human interaction is associated with empathy and understanding, which leads to a higher level of service provision and satisfaction. In some cases, the work of humanoid robots may be less efficient and slower compared to human labor. The analysis of respondents' answers, presented in Figure 2, also provides an answer to our **RQ1**: *What artificial intelligence technologies are used in accommodation facilities in Slovakia?*

Answering the defined **RQ2**: *What are the advantages and disadvantages of implementing artificial intelligence technologies in accommodation facilities?* will be aided by the analysis of questions aimed at identifying the benefits and drawbacks brought by the implementation of artificial intelligence in the surveyed accommodation facilities. Figure 3 presents the benefits of implementing artificial intelligence technologies.

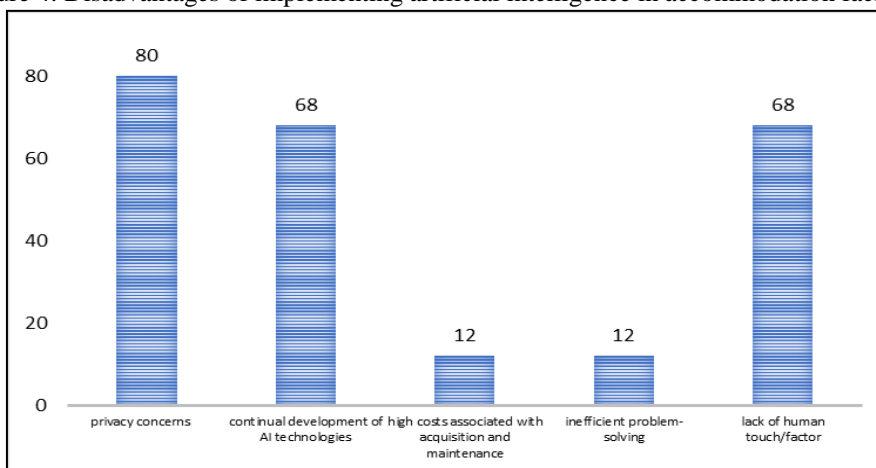
Figure 3: Advantages of implementing artificial intelligence in accommodation facilities



Source: Author's research, 2023

As we can see, the implementation of artificial intelligence in accommodation facilities brings several advantages. It helps streamline processes, leading to faster processing of reservations, check-in and check-out procedures, and overall facility operations. Artificial intelligence also enables personalized services and enhances the customer experience. The communication strategy with visitors improves as technologies provide faster responses to customer inquiries and assist in fulfilling guest requirements. As mentioned earlier, the implementation of artificial intelligence enhances security and protection for both guests and the property itself, contributing to effective management and decision-making by operators and managers. Ultimately, all these advantages enhance the competitiveness of accommodation facilities in the market and customer (and potential customer) satisfaction.

Figure 4: Disadvantages of implementing artificial intelligence in accommodation facilities



Source: Author's research, 2023

The implementation of artificial intelligence in accommodation facilities brings several advantages, but it also has certain disadvantages (Figure 4). One of the main drawbacks is the potential loss of personal touch. With the application of artificial intelligence, customers



may miss the human factor and personal interaction that some prefer. Some interactions and services provided through artificial intelligence can feel cold and impersonal. Another disadvantage is the higher cost associated with implementing artificial intelligence technologies. The initial costs of acquiring and maintaining these technologies can be significant. Security risks are also a challenge. As the use of artificial intelligence technologies expands, the risk of data breaches and cyber threats increase. Improper implementation or inadequate security measures can jeopardize customer privacy and operational security. Dependency on technology is another concern. If an accommodation facility becomes too reliant on artificial intelligence and experiences outages or malfunctions, it can have a negative impact on service provision and customer satisfaction. Limited flexibility in addressing complex situations or specific guest requests is another disadvantage. In such cases, the presence of experienced staff may be necessary to provide individualized solutions. Concerns about job losses are another factor mentioned by respondents in the supplementary question of our survey. It is true that the implementation of artificial intelligence and automation can result in job reductions, which can have negative social and economic implications. Therefore, it is crucial for accommodation facilities to consider all the advantages and disadvantages and ensure a balanced approach to the implementation of artificial intelligence technologies that considers customer needs while minimizing potential negative consequences.

The implementation of artificial intelligence in accommodation facilities also involves financial costs. Initial costs include the acquisition of necessary hardware and software infrastructure, as well as potential expenditures on staff training. It is important to consider the costs of ongoing maintenance and technology updates, as well as possible fees for licenses and service provided by providers. The overall costs can depend on the scope of implementation and the complexity of selected technologies. In this context, we asked respondents about the amount of financial resources invested in the implementation of artificial intelligence technologies in their accommodation facility.

The decision to invest in technology with an amount ranging from EUR 0 to EUR 5,000 corresponds to the results of the question focused on the most commonly used artificial intelligence technologies in the hotel industry (Figure 2). Property Management Systems (PMS) are nowadays essential for maintaining smooth operations in accommodation facilities. The facilitation and acceleration of processes offered by the implementation of this technology are significant and financially accessible for any accommodation facility with any budget. Surprisingly, 10% of respondents (24 accommodation facilities) invested a financial amount higher than EUR 50,001 in artificial intelligence technologies. In this case, it was primarily hotels in the four- and five-star category. In terms of return on investment, half of the respondents (50%) indicated an estimated period within 0 to 2 years. Subsequently, 40% of respondents mentioned an estimated period within 3 to 5 years results.

## **5. Conclusion**

The goal of the presented article was to examine and analyze the application of artificial intelligence in the hotel industry and map out the effects it brings to hotels and other accommodation facilities in Slovakia. Our key focus was to map out the technologies utilized in accommodation facilities in Slovakia and identify the advantages and disadvantages resulting from the implementation of new technologies.

To evaluate the utilization of artificial intelligence and its effects on accommodation facilities, we decided to conduct primary research using the method of sociological survey through a questionnaire. From the responses of our respondents, we can conclude that operators or managers of accommodation facilities are generally conservative when it comes

to implementing artificial intelligence technologies and do not invest significant financial resources in their implementation. The biggest challenge when considering the implementation of artificial intelligence comes with the potential loss of a personal touch. Even though respondents currently view it as a disadvantage, artificial intelligence can improve many aspects of hotel operations. However, it is essential to find the optimal balance between artificial intelligence and the “human touch”, a personal approach to guests. An important finding for us was that a large number of respondents lacked sufficient knowledge and necessary information about artificial intelligence technologies that can be implemented in accommodation facilities. This is also reflected in the survey results, where the majority of respondents associate “artificial intelligence in the hotel industry” mainly with process automation – replacing human employees with robotic technologies (such as receptionists, bartenders, waiters, housekeeping staff, etc.), which indeed require significant financial investment. Despite these results, there are entities in the market that were not afraid to invest a larger amount of financial resources in innovating their accommodation facilities and selected technologies that significantly improved problematic processes associated with facility operations or service provision.

To overcome the lack of awareness about the possibilities of using artificial intelligence in the hotel industry, it is important to increase the knowledge of operators or managers of accommodation facilities about the benefits and opportunities that artificial intelligence brings to the hotel industry. Proven examples and success stories should be shared and disseminated so that everyone can be inspired and see concrete results and advantages of this technology. Additionally, educational programs and training should be made available to help operators or managers gain a better understanding and skills in the field of artificial intelligence, so that they can effectively and efficiently utilize it in their operations. Based on a study of available literature (Huang et al., 2021; Limna, 2023), we would recommend accommodation providers in Slovakia to regularly monitor and evaluate the performance of artificial intelligence, allowing them to identify issues and adapt strategies as needed. One of the recommendations is the inclusion of clients – guests of accommodation facilities in the process of gathering feedback on their experiences with artificial intelligence technologies, as their feedback will help providers tailor their services (Ameen et al., 2021). With a focus on data security, it is important to invest in security solutions and comply with relevant regulations. For accommodation facilities that have not yet experienced the implementation of artificial intelligence technologies, we recommend securing access to artificial intelligence experts who can assist in selecting the most suitable technological solutions and designing their effective implementation.

The implementation of artificial intelligence technologies in the hotel industry brings a multitude of advantages and disadvantages, but it requires careful planning and management. To achieve success in implementing artificial intelligence, service providers in accommodation facilities should consider the practical recommendations mentioned above and draw inspiration from them in their day-to-day practices.

The results of this study provide practical recommendations for accommodation facility operators and managers when deciding on the implementation and optimization of artificial intelligence within their businesses. However, there are limitations and challenges that need to be taken into account and addressed or minimized (Bounatirou & Lim, 2020). Quality and sufficient data are crucial for accurately assessing the results of artificial intelligence implementation. The lack of relevant data can restrict the ability to analyze and evaluate success. Some accommodation facilities may have outdated IT infrastructure or limited access to modern technologies, which can hinder their ability to implement artificial intelligence technologies. The financial cost of implementing artificial intelligence can be substantial, posing a challenge for accommodation facilities with limited budgets. Employees

and clients, the guests of accommodation facilities, may be hesitant to accept artificial intelligence in their daily interactions, which can affect the success of its implementation. Changes in the preferences and needs of artificial intelligence users can impact the effectiveness of artificial intelligence implementation.

Therefore, it is important to consider these limitations and challenges and strive to overcome or minimize them when implementing artificial intelligence technologies in the hotel industry. It is necessary to find the optimal balance between utilizing artificial intelligence to improve operations and maintaining a personal approach to customers, the guests of accommodation facilities.

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## Conflict of interest

The author declares no conflict of interest.

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