Life After COVID-19: Artificial Intelligence in Hotels; In-depth Literature Review

Nthabiseng B. Khoalenyane

Department of Languages and Social Sciences Education University of Zululand, South Africa

Oluwatoyin Ayodele Ajani

Department of Languages and Social Sciences, University of Zululand, South Africa oaajani@gmail.com

Purpose: This study aims to systematically review the impact of artificial intelligence (AI) on the hotel industry post-COVID-19, focusing on articles published between 2019 and 2024. Grounded in the Technology Acceptance Model (TAM), the research examines the relevance and application of AI within the industry, particularly in response to the challenges posed by the pandemic.

Study design/methodology/approach: The study adopts an interpretive paradigm and employs thematic analysis to synthesise findings from various academic journals. Keywords such as 'hotels,' 'tourism industry,' 'COVID-19,' and 'artificial intelligence' are used to identify relevant literature. The methodology involves a detailed literature review and analysis to explore how AI technologies enhance operational efficiencies, service quality, and cost reductions in the hotel industry.

Findings: The findings reveal that AI has become critical in adapting hotel operations to new market realities post-COVID-19. AI technologies offer innovative solutions that align with changing consumer expectations and industry standards, contributing to improved customer experiences and operational efficiency. Integrating AI into hotel management and customer service platforms is essential for the recovery and future growth of the hospitality sector.

Originality/value: This study contributes to the existing literature by providing insights into the impact of AI on the hotel industry post-COVID-19. It highlights the importance of AI technologies in improving hotel customer experiences, operational efficiency, and profitability. The application of the TAM framework underscores the significance of perceived usefulness and ease of use in driving the acceptance and sustained use of AI in the hotel industry. The study recommends ongoing investment in AI technologies and adaptation to technological advancements to meet evolving customer needs and industry demands.

Introduction

The COVID-19 pandemic officially began in Wuhan, China, on December 19, 2019. By mid-March 2020, the virus had spread worldwide, and tourism as an economic industry was affected (Huang et al., 2020). The global measures to curb the virus contributed to the suffering of the tourism-accommodation sub-sector. Different national governments are prepared to fight the COVID-19 virus to protect their citizens safely. Strict measures were implemented to curb the virus, such as lockdowns, people being vaccinated, home quarantine, curfew, keeping a safe distance of two metres from each other, no physical touching, wearing masks and gloves, and online working. While these measures were enforced, the hotel sector was negatively affected. The hotel industry experienced difficulties during the pandemic, and occupancy plunged, leaving hotels to depend on technological innovations. Given the prominent rise of technological innovation, the hotel industry had to continue to survive and service the guests. Artificial intelligence implementation devices, such as automated machines and robots, were considered effective in preventing the spread of the COVID-19 virus. Artificial intelligence devices usually replace human nature and reduce human contact, which is one of the strategies



for curbing the virus while maintaining a safe social distance. AI is becoming a crucial venture in the hotel sector, and hotels should not take these developments lightly.

This burst of COVID-19 has aggravated the high need for new technological innovations in the hotel industry (WHO, 2020). International and domestic activities were immediately halted during this period due to the curbing of virus strategies. People were mandated to test, quarantine, and vaccinate. However, the rate at which the global population was vaccinated could have been faster, as people were still sceptical about the vaccination. The United Nations World Tourism Organisation posited that 66 per cent of all destinations closed their borders either entirely or partially for international tourism (UNWTO, 2021c).

Tourism is a multi-faceted activity that cuts across typical economic sectors and requires four inputs: economic, environmental, and cultural (Sharpley, 2018). However, tourism, unlike other disciplines, does not have a physical output that can be used to measure it. For example, tonnes of corn can be used in agriculture to measure it, which differs from tourism. The structure of tourism also differs from country to country. Mihalic further attests that tourism is about "activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes not related to the exercise of an activity remunerated from within the place visited" (Mihalic, 2002).

Tourism stems from an individual's interaction between the host and the guest. However, the development of technological devices and AI evaluated the tourism industry with its subsectors. The tourism industry contributes to the global GDP through its four essential elements (attractions, destinations, amenities, and accommodation (). Hence, the accommodation sector is pivotal. Lately, hotels as a sub-sector of accommodation have been considered the strong tourism backbone and are reflected as the most developed and pivotal economic booster globally. However, with the COVID-19 pandemic, the accommodation sector had to change from contact, face-to-face interaction and physical experience to rely on artificial intelligence, especially after numerous countries had to be locked down to curb the spread of the virus. Therefore, this study's overarching ng drive is to examine artificial intelligence in hotels after COVID-19. This study will use the hotel element under the accommodation element. The hotel sector is heavily dependent on customer appraisals and depictions.

Dated back aeons of time, travellers used caves and trees for accommodation. The frequent Travellers instilled a need for accommodation, and hotel accommodation was born. The word "hotel" is a French word meaning a large house. Nowadays, the industry is distinct and offers travellers places to stay to satisfy their interests. Some guests pursue accommodation from diverse types of accommodation such as Bed and Breakfast (B&B).

Nonetheless, due to COVID-19, physical interaction was restricted, and the innovation of artificial intelligence took over, controlled, and managed COVID-19, in return letting the hotels run profitably. AI influenced tourists' service and experiences (Soares et al., 2021). Human-to-human interactions have been replaced by artificial intelligence.

Literature Review

Tourism dependence on technological innovations has been made clear by the arrival of the COVID-19 pandemic. Nonetheless, tourism as a service industry provides services that meet the actual needs of an individual through their profile. The profile entails individuals' choice of accommodation, food and beverages, transport modes, and leisure activities; hence, the tourism industry must deliver exceptional service. Guests consider a few elements when choosing a hotel. Those substantial elements are the location where an accommodation is located, the

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security, the hotel's cleanliness and the hotel's cost. Altinay posits that the quality of services enhances the future purchase decisions of the hotel, and the prospects to deliver a better customer experience are created by advanced technology (Altinay & Poudel, 2015). The concept of AI in this research refers to a system in both digital form and robots that approximates human beings and makes input-based decisions. The digital form could be an application on a computer or smartphone (Maphalala & Ajani, 2024).

Hotels and Artificial intelligence (AI)

The main objective of a hotel is to lodge a reasonable number of people and offer them a welldeserved service. Hotels offer different service experiences to guests. The hotel industry is part of the fast and immersive tourism sector, capable of holding on to its guests because numerous people travel daily from one destination to another. However, employees in the hotel industry must keep up with the latest innovations and trends.

Artificial intelligence describes the tasks associated with human intellect that are performed by computers (Maphalala & Ajani, 2024). The computer assimilates information and acts appropriately (Borghi et al., 2020). Lai and Hung attest that artificial intelligence is human intelligence imitated by technological advances in production or problem-solving (Lai & Hung, 2018). AI provides comparable results as expected from human touch but through mechanisms. However, technological innovations amounted to decreased human effort in carrying out different activities from different departments. AI has become a pull factor that has detonated creativity in the industry and, in the process, reduced human labour for some jobs. Hotels have been receptive to AI, as have many other sectors and disciplines. With AI, hotels perform distinct functions such as advertising, employee theft reduction, customer care, reduction of costs, and marketing. Tourism clientele has proven that Artificial intelligence systems have multiple applications, especially in the hotel sector. The fourth industrial revolution was a buzzing concept, and during this era, the technological development of the accommodation sector was booming. Customers' daily lives changed, and they started using the latest technologies to their advantage frequently; the hotel sector became one of the most imperative activities.

With AI, guests can search for more relevant information according to their profiles. It also gives guests freedom of choice, influences decision-making, and provides an anticipated tourism experience. Moreover, AI aids hotel management in managing the business more easily than before the inventions (Tussyadiah & Miller, 2019). AI is not controlled by emotions like human beings, leading to more production and making of sound decisions. Unlike humans, AI works all day, 24 hours a day, seven days without tiring. It is also used for personalised service delivery in hotels as artificial intelligence-powered robotics supplement human intelligence and support physical capabilities (Pillai & Sivathanu, 2020). According to (Hussein et al., 2021), technological innovations are drastically changing the hotel sector. AI now does the in-service duties. The technology Acceptance Model expounds on artificial intelligence in hotels.

Theoretical Framework

The Technology Acceptance Model (TAM) (Davis, 1989) is a model used to underpin this study as a theoretical foundation because not only is it thrifty, but it also has numerous studies in tourism and hospitality research areas that extensively support this model. (TAM's main objective was to highlight technology's reception to predict and explain practical technology innovation. TAM has been adopted in this study to predict and further explain the tourist's behavioural intentions. It is worth noting that TAM was originally developed in the information system discipline; however, with the changing times, TAM is extensively adopted in the tourism and hospitality discipline, including online bookings behaviour and mobile payment behaviour (Zhong et al., 2022).

This model has been applied to assess the adoption of innovative technology, services, or products. TAM informs practitioners of the measures to be taken before implementing the system. According to Venkatesh and Davis, 2000 technology acceptance has three, whereby cognitive responses (perceived ease of use and usefulness) are triggered by the external forces (stages system design features), which form an affective response (attitude towards technological innovations) influencing user behaviour. Perceived ease of use is "the degree to which a person believes that using a particular information system would enhance his/her job performance." In contrast, perceived usefulness is "the degree to which an individual believes that using a particular system is free of physical and mental effort" (Davis, 1989). TAM signifies the behaviour as a predicted outcome by both perceived ease of use and perceived usefulness plus the behavioural intention, as demonstrated in Figure 1.

The expectations of positive behavioural outcomes are captured by perceived ease of use and usefulness. Davis, 1989 believes that they will not be labour-consuming. Studies were conducted, and the findings reflected that the attitude towards behaviour can be substituted by behavioural intention (Agarwal & Karahanna, 2000). When the effective response is higher, the behaviour likelihood becomes higher, too. This is in line with an understanding that the effect of perceived usefulness on actual use can be direct, underscoring the significance of the variable in predicting the behaviour. Granted, the behaviour is not directly affected by perceived ease; it underpins the effect of perceived usefulness (Zhong et al., 2022).

TAM implies that it is more likely that an easy-to-use application will become useful to users, and the ease of use will stimulate the acceptance of the invented technology. Furthermore, TAM can capture business contexts and specific technology (Lee et al., 2003). A tablet application is a perfect example in the hotel setting. Self-service and mobile technology have validated numerous studies in TAM, including those on hospitality (hotels). Hence, we deemed TAM the most suitable and appropriate theoretical background for this study.

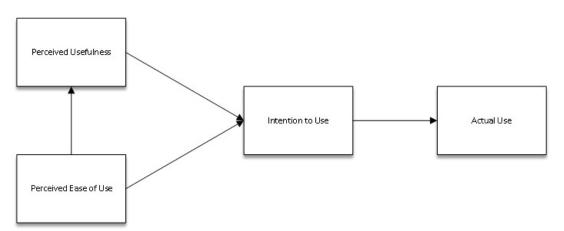


Figure 1. Technology Acceptance Model (TAM)

TAM Model Davis, 1989: <u>https://www.google.com/search?q=technology+acceptance+model</u>

Use of AI in hotels

In this era of technology, artificial intelligence (AI) can help the hotel industry provide better experiences for guests. AI must be embraced rather than feared because it can rationalise

production and management, enabling an efficient and seamless experience for the host and the guest. AI has a broad influence not only on the hospitality industry but also on numerous industries. Hence, it is crucial to consider its potential.

Chatbots

In the hospitality industry, there is contact between the service provider and the guest. Hence, there is a need for active communication skills encompassing the provision of a service and oral eloquence. Two complementary truths in the hotel industry should be addressed: the guests' experience of emotional labour and the interaction in service delivery. However, after the 2019 pandemic (COVID-19), things changed since closer contact was banned in aid to curb the virus. Industries were then forced to go the artificial intelligence (AI) route. That is where AI, through chatbots, conducted voice control or text-based conversations (Cain et al., 2019; Nuruzzaman & Hussain, 2018). Service delivery was achieved without the physical presence of human beings. The robots could perform tasks requiring mobility and sensory abilities without needing a human being and intelligence tasks.

In the hotel industry, chatbots were made available on tablets, some in smartphone applications. Customers could send and receive messages with information on the services they needed in a hotel setting. Chatbots allow customers to order food and drinks, make bookings, and call a taxi by providing the necessary details. Additionally, the bots assist with hotel room facilities. However, there is still a threat of human beings losing their jobs, as these chatbots are replacing the hosts and taking over from the human staff. AI innovations in the hotel industry heavily depend on technological and labour costs (Cain et al.,2019; Ivanov & Webster, 2017). It has already been highlighted that digital engagement has replaced human interaction, expanding the hotel sector options. The chatbot application provides better service to guests since it monitors guests' data and saves money. However, there is still room for the shallow knowledge of AI in hotels, especially in developing countries. This article, therefore, aims to investigate AI usage in the hotel sector.

Face Recognition

The most recent technological innovation in the hotel industry is face recognition. This technology recognises the human face in videos or photos and assesses the appearance of the face of the person who appeared. Most hotels use this feature for security purposes; the face scan makes it easy to determine their guests and people who are not booked in their hotel and makes it hard for security breaches. As much as face recognition was used for security, there were other aims. The main aim was to adhere to the WHO instruction of keeping a distance from each other to curb the virus since guests did not need to touch access cards and pass them to another person as it could transfer the virus. Usually, facial recognition is detected during the online booking stage, and the guests are given the password. Facial recognition (FER) systems are AI systems that aim to detect human faces (Jia et al.,2021). A guest gains access through face recognition. They assisted in shortening the check-in time on guests' arrival at the hotel and made the check-in process more efficient.

Face recognition makes things easier for both the guests and the host. It is a self-service aptitude, and guests do not need to wait at the reception area or front desk to be checked in. Facial recognition allows them to quickly check in and out without wasting time (Unal & Tecim, 2018). Table 1 supports the use of AI under face recognition and demonstrates the research conducted to justify the importance of face recognition. The table shows the main focus of each research conducted on face recognition and the findings of each study.

Author	Article Research	Focus	Findings
1. Liu, X., Li, C., Nicolau, J. L., & Han, M. (2022).	Face recognition of profile images on accommodation platforms.	To find out if attractive guests are more likely to receive better service from their hosts due to face recognition.	Empirical results revealed that attractive guests are more satisfied with their accommodations and receive more interactions from hosts.
1. Gupta, S., Modgil, S., Lee, CK. et al. (2023).	The future is yesterday: Use AI- driven facial recognition to enhance value in travel and tourism.	driven facial recognition	The findings indicated that artificial intelligence face recognition can facilitate tourism by understanding guests' needs, service offers and services.
 3. Kement, U.,Cavusoglu, M., Başar, B., & Tomris Küçün, N. (2024). 	Facial emotion recognition research in the hospitality and tourism industry: a thematic content analysis.	the use of facial emotion	The results showed that the most common type of usage in the FER system was facial expression at 24.5%, followed by facial expression recognition at 22.6%. In third place, Face Reader held at 9%, followed by emotion recognition at 8.4%

Table 1. Example	s of face reco	gnition studies
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Robots

The COVID-19 hit the global community, and measures had to be implemented to prevent the virus from spreading. The pandemic affected some industries and businesses because the human workforce was no longer needed. People had to keep a safe distance, and there was no contact, and working hours were reduced. Modern technology then performs the tasks that are usually performed by human beings. The penetration of robots in hotels then offered room service and housekeeping. Zhong and Verma, 2019 presented that guests used robots to control facilities within the hotel industry and services such as food delivery.

Robots have evident tourism and hospitality functions such as luggage delivery. They gather information and act as commanded; unfortunately, these robots replace the hotel staff. There is no more the tangible sight of human beings; they use human-like audio and visual abilities. A perfect example would be travel-mate autonomous suitcases. They follow the owners wherever they go (Travelmate, 2019).

In most cases, the robots were adopted to perform the human task during COVID-19. Robots provide services 24/7 without getting tired. In one hotel was a virus assassination robot, a high-resolution system to prevent a virus infraction. Some hotels use "Germ-Zapping Robots" to combat germs through UV light, which kills the virus (Rosen, 2020). This means the robots disinfected the hotel and kept it virus-free. The robots operated by the algorithm and instructed

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to find instructed to find and destroy the virus. Some hotels from developed countries continued using robots to offer guests clean and germ-free rooms.

Author	Article Research	Focus	Findings
Kim et al. (2021)	Preference for robot service or human service in hotels? Impacts of the COVID-19 pandemic	Examines the impact of robots and AI on hospitality jobs during the COVID-19 pandemic, focusing on travellers' preference for robot-serviced or human- serviced hotels.	The findings highlighted the significance of human interaction in hotel service provision.
2. Samala et al. (2022)	Impact of AI and robotics in the tourism sector: a critical insight	The focus was on the impact of robotics AI technological innovations in tourism.	The findings demonstrated that technological innovations could not only partially replace human beings in tourism.
3. Kemer & Tyagi (2023).	ApplicationofArtificial	To evaluate the use of artificial intelligence and robotic technologies in the field of tourism marketing	The results determined that AI offers personalised and new opportunities for tourists when they decide to travel.
4. Licardo, Domjan, & Orehovački, (2024).	Intelligent Robotics: A Systematic Review of Emerging Technologies and Trends	It is aimed to analyse the evolving technological innovations and shifts in intelligent robotics.	Results indicated the significance of focusing on human-robot collaboration.

Table 2. Examples of research articles on robots in the Tourism industry

Voice Assistance

Voice assistants (VAs) are voice-activated artificial intelligence devices. They mimic intelligent human behaviour and have some level of intelligence through digital interfaces (Poushneh, 2021). These progressive technologies have numerous noticeable issues, such as user frustration, limited awareness of their technical capabilities, and a certain degree of hostility from hotel guests and staff (Lukanove & Ilieva, 2019). The hotel operations and hotel rooms gradually granted voice assistant access. COVID-19 taught us that people need to up their game with technology, and guests have become more technologically proficient in their daily lives. Hotels were then forced to upgrade and modernise their innovative approaches to serve their guests. Hotels, like any other industry, have experienced smart technologies and digital approaches. Voice assistants help hotel guests without having to speak to reception staff

because the voice bot understands customer questions and responds accordingly based on a voice memo provided.

Methodology

This study uses a systematic review of the literature on "artificial intelligence," "innovations in the tourism industry", "hotels", "robotics" and "hospitality". We conducted academic peer-reviewed articles published between 2019 and 2024. The search was conducted using two electronic databases, Google Scholar and Scopus. The aim was to understand the relationship between related fields and themes and look for opportunities for future studies. The articles were then analysed to identify the effect of artificial intelligence on hotels. The inclusion criteria for this study were articles written in English and peer-reviewed journals focused on hotels and innovations in tourism. Titles, abstracts, and full texts were screened, and some were included and used for this study. The academically indexed data from Google Scholar was the main reason for our choice over the traditional databases.

Moreover, this study used full-length journal articles and excluded other papers such as conference papers and reviews. Only a little was retrieved from the books; hence, we opted to exclude the books. The table below shows the inclusion and exclusion criteria used for this study.

Inclusion criteria	Exclusion criteria	
1. English language written papers.	All published articles with subjects not related to hotels and artificial intelligence.	
2. Published articles between 2019 and 2024		
3. The journal's source type (Google et al.)		
 Search protocol: "hotel", "artificial intelligence", AND OR "artificial intelligence in hotels." 		

Table 3: Inclusion and Exclusion Criteria

Results and Discussion

AI's role in the hotel industry has increasingly been seen as a source of significant innovation, particularly in the context of evolving customer service models and the impacts of the COVID-19 pandemic. Utilising the Technology Acceptance Model, this study explores how hotels have adapted AI technologies to meet changing consumer preferences, particularly transitioning from traditional contact-based services to contactless interactions. This shift has been accelerated by pandemic-related health and safety concerns, pushing guests and operators to embrace digital solutions.

The introduction of AI in various hotel operations, including bookings and check-ins facilitated through advanced technologies such as facial recognition, has significantly reduced the need for traditional reception interactions, thereby enhancing efficiency. The acceptance of AI by guests has grown; they appreciate its non-fatiguing nature, practicality, and ability to offer services continuously around the clock. Adopting such technologies caters to immediate

operational efficiencies and contributes to an improved guest experience by reducing wait times and streamlining processes.

Moreover, this shift towards AI has broader implications for the hotel industry's competitive landscape. The integration of AI helps build a strong brand image through targeted marketing and promotional activities powered by AI and drives greater operational turnover. Research by Li et al. (2019) supports this, suggesting that AI adoption fosters a more competitive environment, potentially increasing revenue.

Despite these positive trends, the study notes that research on AI within the hotel industry remains decentralised. While a growing body of work explores the impact and implementation of AI and robotics in hospitality, there remains significant room for more profound, more integrated research efforts. This indicates a burgeoning field of study ripe for academic exploration and industry application, suggesting that as the technology evolves, so will its integration within the hotel sector. As AI becomes more embedded in hotel operations, ongoing research and adaptation will be vital in leveraging its full potential for enhancing guest satisfaction and operational efficiency.

The utilisation of Artificial Intelligence (AI) in the hotel industry, driven by innovations and the necessity imposed by the COVID-19 pandemic, marks a significant transition from traditional service methods to modern, contactless interactions. This study employs the Technology Acceptance Model to analyse how AI integration aligns with hotel operations and guest preferences, revealing a shift towards technology-based services such as automated bookings and facial recognition check-ins. These AI-driven processes enhance operational efficiency and improve guest experiences by minimising wait times and streamlining services.

As guests become more accustomed to these technological interactions, their preferences have notably shifted towards favouring AI's non-fatigue nature and its capability to provide constant service. This adjustment has led to increased efficiency within hotel operations and an enhanced competitive stance in the industry. The comprehensive adoption of AI aids in building robust brand images and facilitates effective marketing strategies, which can significantly boost hotel revenues.

However, despite these advancements, the study identifies a fragmentation in research related to AI in hospitality, suggesting a growing yet decentralised body of academic work. This burgeoning interest indicates potential for further exploration and deeper integration of AI technologies in the hotel sector. The ongoing evolution of AI necessitates continuous research and adaptation to fully leverage its capabilities, suggesting that the future of hotel industry operations will increasingly rely on these technologies to meet customer expectations and maintain competitive advantage.

Integrating AI into hotel management and operations is transforming the industry by enhancing guest interactions and operational efficiencies. This transformation supports better customer service and positions hotels better within the competitive market, leveraging technology for strategic advantage and revenue growth.

Implications of the Study

The findings of this study hold significant implications for various stakeholders within the hotel industry, especially in the context of integrating Artificial Intelligence (AI). For hotel operators, adopting AI can enhance operational efficiency and reduce labour costs by automating routine

tasks such as check-ins and customer inquiries. This shift streamlines operations and allows staff to focus on providing higher quality, personalised service where human interaction adds more value.

Hotel guests are another crucial stakeholder group impacted by these developments. As preferences shift towards contactless services AI facilitates during the COVID-19 pandemic, guests will likely expect and demand these conveniences as standard offerings. The seamless experience AI technologies provide can increase guest satisfaction and loyalty, which are important metrics in a highly competitive industry.

From a managerial perspective, the strategic implementation of AI can serve as a differentiation factor in the market. Hotels successfully integrating AI technologies can position themselves as forward-thinking and innovative, appealing to tech-savvy travellers. Additionally, the ability to gather and analyse data through AI can help hotel managers better understand guest preferences and tailor services to meet the evolving needs of their clientele.

For the broader hospitality industry, the implications of AI adoption extend to regulatory and ethical considerations. Stakeholders must navigate concerns such as data privacy, the displacement of jobs by automation, and maintaining a balance between technological convenience and delicate touch. Addressing these concerns transparently and thoughtfully is essential to fostering acceptance and trust in AI technologies among consumers and employees.

Lastly, academic and research institutions can draw from these findings to further explore the long-term impacts of AI on the hospitality sector. There is a need for ongoing research to monitor trends, innovations, and the societal implications of AI, ensuring that its deployment enhances the industry sustainably and equitably. This study thus not only informs current practices but also sets the stage for future inquiries into the transformative potential of AI in hospitality.

Conclusion

Artificial intelligence systems such as laptops and smartphones allow guests to browse hotels to book for their holidays and make convenient and cost-effective decisions. Wang, Xiang, and Fesenmaier, 2014 support the significance of artificial intelligence in hospitality and tourism. Their study extended TAM by incorporating the understanding of technology acceptance in hotels. The results of the study suggested that the determinants of the guests are not only driven by cognitive beliefs but also influenced by consumer experience and knowledge of artificial intelligence apps. The design and features of mobile apps are critical to providing hotel consumers with an informational, enjoyable, and immersive experience, consequently affecting their usage of mobile apps. Using AI has empowered hotels to appraise and improve performance in the tourism industry. Additionally, bookings and reservations through AI systems have become more accessible to browse and shift comfortably through areas with advanced offers. Hotel occupation has become more flexible than before due to AI.

Limitations of the Study

Limitations in the literature review can be improved by integrating databases in additional languages and other accommodation sub-sectors, such as guest houses and bed and breakfasts. This systematic literature review identified several research opportunities and gaps. The identified gaps might guide prospective researchers and extensively contribute to the theoretical development of artificial intelligence and the TAM in the hotel industry. Research is also needed to understand the ethics associated with applying AI in the tourism and or hotel industry,

such as social deprivation, data privacy, and data protection; how to potentially increase the guests' occupancy and operational efficacy in tourism; and or understanding the function of AI and how it can aid employee's satisfaction and customer service.

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