APPLICATION OF ARTIFICIAL INTELLIGENCE IN TRAVEL, HOSPITALITY, AND TOURISM: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

This study explores the applications of artificial intelligence (AI) in the travel, hospitality, and tourism sectors. A systematic literature review was conducted to gather and analyse knowledge in this domain, utilising the SPAR-4-SLR protocol for the review process. The 5W+1H framework was employed to structure and report the findings. A comprehensive extraction and analysis procedure identified relevant insights using content analysis. The results highlight several potential AI applications in these sectors, including chatbots, the Internet of Things (IoT), predictive analytics, natural language processing, robotics and automation, image and video recognition, and virtual, augmented, and mixed reality technologies. The roles of a chatbot are real-time assistance, booking support, personalised recommendations, multilingual customer interaction, post-travel engagement, and customer experience. The role of IoT is in smart hotel rooms, smart airports, wearable technology, location-based beacons, wristbands in theme parks, smart cities, and customer experiences. Predictive analytics is used for demand forecasting, dynamic pricing, airline operations, revenue management, tailored travel packages, destination management, and data-driven decision-making. Robotics and automation are applied to enhance customer service, operational efficiency, streamlined operations, and attraction engagement. Virtual, Augmented, and mixed reality include exploring destinations, virtual walkthroughs, pre-trip experiences, real-time experiences, interactive tours, virtual concierge services, themed resorts, and entertainment destinations, enhancing personalisation and innovative engagement. This research provides valuable insights into the transformative role of AI in the business sector and the travel, hospitality, and tourism industries, offering guidance for enhancing efficiency, personalisation, and innovation. It also highlights the need for supportive policies and ethical frameworks to ensure responsible AI adoption, benefiting businesses, customers, and society.

Keywords: Artificial intelligence, Chatbot, Internet of things, Natural language processing, Travel, Hospitality, Tourism

1. INTRODUCTION

Information Technology (IT) platforms are a foundation for modern business operations, enabling organisations to streamline processes, enhance productivity, and foster innovation. These platforms integrate hardware, software, and network systems to facilitate data management, communication, and decision-making across various business functions. IT platforms are integral to the travel, hospitality, and tourism industries, providing a unified ecosystem for managing operations, enhancing customer engagement, and driving growth (Buhalis & Leung, 2018). These platforms incorporate advanced tools such as reservation and booking systems, customer relationship management (CRM) software, and dynamic pricing algorithms to optimise resource allocation and revenue management. Cloud-based technologies enable seamless communication across stakeholders, from travel agencies and hotels to transport providers, ensuring real-time coordination and efficiency (Buhalis & Sinarta, 2019). Additionally, IT platforms support data analytics to uncover consumer behaviour patterns, inform marketing strategies, and improve service personalisation. Integration with emerging technologies, such as mobile apps, virtual reality (VR) for immersive experiences, and the Internet of Things (IoT) for innovative services, further enhances the customer journey (Doborjeh et al.,2022). As digital transformation reshapes these sectors, IT platforms provide a critical foundation for sustainability, innovation, and competitive advantage.

Artificial Intelligence (AI) is revolutionising the business landscape by driving innovation, improving efficiency, and enabling data-driven decision-making. AI technologies like machine learning, natural language processing, and predictive analytics empower businesses to automate routine tasks, enhance customer experiences, and optimise resource utilisation (Fadhel et al., 2024). Applications of AI range from chatbots for customer service and recommendation systems in e-commerce to advanced analytics in finance and supply chain optimisation. Furthermore, AI facilitates personalised marketing strategies and real-time data insights, allowing companies to adapt swiftly to market trends and consumer behaviour. As businesses increasingly integrate AI into their operations, they gain a competitive edge through improved agility, cost reduction, and the ability to unlock new opportunities in a rapidly evolving digital economy.

Artificial Intelligence (AI) is transforming the travel, hospitality, and tourism industries by enhancing operational efficiency, personalising customer experiences, and driving innovation. AI-powered tools, such as chatbots and virtual assistants, streamline customer interactions by providing real-time

booking support, itinerary management, and inquiries (Fernando et al., 2020). Machine learning algorithms enable dynamic pricing, demand forecasting, and inventory optimisation, ensuring better resource allocation and revenue management. In addition, AI enhances personalisation through data analytics, offering tailored recommendations and experiences based on customer preferences and behaviour. Integrating AI into innovative technologies, such as facial recognition for seamless check-ins and IoT-enabled rooms, further elevates service quality. By leveraging AI, the travel and hospitality sectors can adapt to evolving consumer demands, improve operational workflows, and maintain a competitive edge in the digital economy (Gretzel et al., 2020).

Previous research has extensively examined the transformative role of AI platforms in the travel, hospitality, and tourism industries, focusing on their ability to enhance efficiency, personalisation, and customer engagement. Studies have highlighted the impact of AI-driven chatbots and virtual assistants in automating customer service tasks, providing real-time assistance, and improving customer satisfaction (Tussyadiah et al., 2020). Machine learning algorithms have been widely explored for their effectiveness in dynamic pricing, demand forecasting, and inventory optimisation, enabling businesses to maximise revenue and resource utilisation (Xiang et al., 2021). Additionally, researchers have emphasised AI's ability to analyse big data to offer personalised recommendations and create tailored customer experiences, thus increasing loyalty and satisfaction (Gretzel et al., 2020). Emerging technologies, such as AI-integrated IoT devices and augmented reality, have also been examined for their potential to enhance operational workflows and deliver immersive experiences (Doborjeh et al., 2022; Ivanov & Webster, 2019). These studies collectively illustrate AI's capacity to reshape the travel, hospitality, and tourism sectors through innovation and strategic adaptability. As described above, the content analysis of existing reviews reveals the absence of a wide-ranging synthesis of the empirical literature. This leaves a gap for a state-of-the-art framework-based systematic literature review in AI in Travel, tourism, and hospitality.

The travel, hospitality, and tourism industries are among the most dynamic and customer-centric sectors globally, relying heavily on innovation to meet evolving consumer demands. Artificial intelligence (AI) has emerged as a transformative force, offering capabilities to enhance personalisation, streamline operations, optimise resource allocation, and improve decision-making. Despite its potential, the integration of AI in these sectors varies and uneven adoption across countries due to several challenges and technical

limitations. Previous researchers have commonly explored AI applications in the broader business sector (Al Dhaheri et al., 2024; Chong et al., 2024; Grashof & Kopka, 2023; Agrawal, Gans, & Goldfarb, 2018) or focused on specific industries such as banks (Sheth,2022), Telecom (Chen, Li & Chen, 2021), etc. However, the application of AI, specifically within the travel, hospitality, and tourism sectors, remains underexplored. While a growing body of research explores AI applications in travel, hospitality, and tourism, the literature remains fragmented and often lacks a holistic understanding of its applications. Existing studies focus on specific aspects, such as recommendation systems or customer experience, without providing a comprehensive overview of AI's role in travel, hospitality, and tourism countries. Furthermore, the rapid pace of technological advancements and the unique socio-economic factors influencing the adoption of AI in different contexts necessitate a systematic evaluation of existing knowledge. A systematic literature review is needed to consolidate current research, identify knowledge gaps, and establish a foundation for future studies. This review aims to systematically scrutinise and compile empirical research on AI applications, explore the role of AI in the business sector, and explore the role of AI in travel, hospitality, and tourism.

2. SYSTEMATIC REVIEW METHOD

The systematic literature review has proved to be a highly effective methodology for gathering and analysing existing knowledge of a specific area (Vijerathne et al., 2024; Chathuranga et al., 2024; Bandara et al., 2024). Researchers recommend systematic reviews as a superior source of evidence regarding current knowledge in a general field or to substantiate the existence or otherwise of a given relationship. According to Petticrew (2006), a 'systematic review is beneficial when a general overall picture of the evidence in a topic area is needed to direct future research efforts, or when an accurate picture of past research and past methodological approaches is required'. In general, the systematic procedure follows a funnelling process; they are general literature search, literature review (narrative Process), refined literature search, assessing the remaining studies and key factors identification, examination of the content of similar studies, evaluating and compiling selected publications, structuring of information and presentation and evaluation criteria. The general literature search to a broad literature database search of Artificial intelligence yielded 82 articles, which were the input into the first narrative step. At the first AI application derived, following this literature review narrative process, each AI application was applied as a term in a dedicated search, resulting in 98 articles. All these research papers were indexed and Journal papers. An

extraction and analysis procedure resulted in relevant statements as findings using a content analysis.

This research applied the SPAR-4-SLR protocol for the systematic review (Paul et al., 2021). This method has three stages: assembly, arrangement, and assessment. Assembling includes identification, acquisition, and organisation; arranging includes purification and evaluation; assessing includes evaluation and reporting (Table 1). The researcher used the 5W+1H framework to report the review (Callahan, 2014). It explains what, who, when, where, why, and how-based questions to report the review.

Table 1: SPAR-4-SLR Protocol

Assembling	**Identification**: The research domain: AI in the travel, hospitality, and tourism sectors The research question: What are the AI applications and key roles in travel, hospitality, and tourism? Sources type: Journals articles Source quality: Emerald, Taylor and Francis, Elsevier, Springer **Acquisition** Search mechanism and material acquisition: Emerald, Taylor and Francis, Elsevier, Springer Search period: December 26ᵗʰ November 2024 to 05ᵗʰ December 2024 Search keyword: AI, travel, hospitality, and tourism sectors Total number of articles searched:
Arranging	**Organisation** Organising codes: Journal title, publication year, theories, context, characteristics, methodologies Organizing framework(s): The 5W+1H **Purification** Article type excluded (and the total number for each type of exclusion): Document type: Conference paper excluded (23) and predatory journals excluded (14) Article types included: Article-indexed, peer-reviewed journals Number of articles (final): 98
Assessing	**Evaluation** Analysis Method: Content Analysis Agenda proposal method: Research Gap analysis **Reporting** Reporting Conventions: Table 2, Figure1

Source: Authors' own

3. GENERAL FINDINGS

The systematic review reveals a hierarchically structured framework (Table 2). This framework contains the seven main AI applications: *Chatbots, Internet of Things (IoT), Predictive Analytics, Robotics and Automation Natural Language Processing (NLP), Image and Video Recognition, and Virtual, Augmented, and Mixed Reality*. The results revealed that Chatbot applications are considerably more often apparent in the literature (78) than IoT (65), Predictive analysis (32), Robotic and automation (45), NLP (46), Image and Video Recognition (24), and Virtual, Augmented and mixed reality (17). The systematic literature review concludes that Chatbots as an IT instrument in AI applications appear more than any other AI applications.

Table 2: Role of AI

AI applications	n	Roles in business sectors	n	Roles in travel hospitality and tourism	n
Chatbots	78	24/7 Customer Support, Enhanced Efficiency, Customer Engagement, Improved guest experiences, Operations Versatility	54	Real-Time Assistance, Booking Support, Personalized recommendations, multilingual Customer Interaction, Post-Travel Engagement & Customer Experience	24
Internet of Things (IoT)	65	Predictive Maintenance, Energy Management, Smart Warehousing, Inventory Management, Logistics and Fleet Management, Real-Time Monitoring, Smart Homes and Offices	49	Smart Hotel Rooms, Smart Airports, Wearable Technology and Location-Based Beacons, Wristbands in Theme Parks and Smart Cities, and enhanced Customer experiences	16
Predictive Analytics	32	Anticipating Market Trends and Consumer Behavior,	24	Demand Forecasting, Dynamic Pricing, Airline Operations, Revenue Management, Tailored Travel Packages, Destination Management, and data-driven Decision-Making	8
	32	Marketing and Customer Engagement, Risk Management in Finance, Supply			

		Chain Optimization, Human Resources and Workforce Planning, Healthcare Resource Allocation, Mitigating Risks & Optimizing Operations		
Robotics and Automation	45 45	Manufacturing Efficiency, Logistics and Warehouse Automation, Retail and Inventory Management, Healthcare Advancements, Customer Service Enhancement, Cost Reduction and Productivity	34 34	Enhanced Customer Service, Operational Efficiency, Streamlined Airline Operations, Tourism Attraction Engagement, Food and Beverage Automation	11
Natural Language Processing (NLP)	46 46	Customer Service Enhancement, Sentiment Analysis in Marketing, Streamlined Document Processing, Personalized Recommendations in E-Commerce, Improved Recruitment and Hiring, and efficient Management of Language-Driven Tasks	35 35	Customer Service Enhancement, Tailored Travel Recommendations, Sentiment Analysis, Voice-Activated Services, Translation Tools, and Data Analysis for Marketing	11
Image and Video Recognition	24 24	Quality Control in Manufacturing, Facial Recognition in Security, Visual Search in Retail, Brand Monitoring in Marketing, Inventory	18 18	Facial Recognition for Check-ins, Landmark Identification, Security and Visitor Management, Marketing and Promotion, Customer Reviews Analysis, Enhanced Customer	6

	Management, Autonomous Vehicles in Automotive, Surveillance Systems, Personalized Shopping Experiences	Experience & Innovation in Operations	
Virtual, Augmented, and mixed reality 17	Customers visualise products, make informed purchasing decisions, take Virtual property tours, Explore 17 spaces remotely, receive Real-time guidance, train surgeons and conduct simulations, create immersive, risk-free practice environments, engage in gaming and immersive experiences, and enhance user experiences and customer engagement.	Explore destinations, virtual walkthroughs, pre-trip experiences, real-time experiences, 13 access detailed information, interactive tours, virtual concierge services, themed resorts, and entertainment destinations, adapt to guest preferences, enhancing personalisation innovative engagement	4

Source: Authors' own

3.1. Role of Chatbots

The key findings revealed the role of Chatbot in the business sector and travel, hospitality, and tourism industries (Table 1). Chatbots play a transformative role in the travel, hospitality, and tourism industries by enhancing customer service, improving operational efficiency, and delivering personalised experiences (Kedi et al., 2024). These AI-powered tools provide real-time assistance, addressing customer inquiries, managing bookings, and handling cancellations or refunds efficiently. Platforms like Booking.com utilise chatbots to streamline hotel reservations and support multilingual interactions, ensuring global accessibility. Similarly, robotic

concierges in hotels offer guests localised travel tips and hotel information, enriching their overall experience. Chatbots on travel planning platforms assist users with flight searches, vacation planning, and tailored itinerary suggestions based on individual preferences. They also enhance post-travel engagement by collecting feedback and addressing customer concerns (Doborjeh et al., 2022). By automating routine tasks, chatbots reduce operational costs, improve response times, and enable businesses to deliver seamless and efficient services. These applications demonstrate chatbots' critical role in modernising and optimising the travel, hospitality, and tourism sectors.

3.2. Role of IoT

The IoT contributions to business sectors and travel, hospitality, and tourism industries are retrieved in Table 1. The Internet of Things (IoT) is transformative across diverse business sectors, enabling more innovative, efficient, and cost-effective operations (Fernando et al., 2020). Integrated with AI, IoT facilitates predictive maintenance by using sensors in manufacturing equipment to detect anomalies, reduce downtime, and extend asset lifespans. The Internet of Things (IoT) has revolutionised the travel, hospitality, and tourism industries by enhancing operational efficiency, improving customer experiences, and promoting sustainability. In the hospitality sector, IoT enables smart hotel rooms where guests can control lighting, temperature, and entertainment systems using smartphones or voice commands. In contrast, hotels personalise guest stays by adjusting room settings based on previous preferences. In the travel industry, airlines leverage IoT with RFID tags and mobile notifications for real-time baggage tracking, minimising lost luggage incidents. Smart airports utilise IoT sensors to monitor crowd levels, optimise security queues, and provide real-time updates to travellers, ensuring a smoother experience (Buhalis & Sinarta, 2019). Tourism operators use wearable technology and location-based beacons to offer real-time guidance and personalised recommendations. IoT-enabled wristbands in theme parks like Disney World streamline park navigation, enable cashless payments, and track visitor preferences to enhance experiences. IoT applications in smart cities also support sustainable tourism by managing resources like energy and water through connected systems. These innovations empower businesses to deliver seamless, personalised, eco-friendly services, reshaping global travel, hospitality, and tourism.

Role of Predictive Analytics

The findings revealed the roles of predictive analytics in business sectors and travel, hospitality, and tourism industries (Table 1). Predictive analytics is a powerful tool that helps businesses anticipate market trends, optimise operations, and make data-driven decisions. Leveraging historical data and advanced algorithms enables businesses to effectively forecast outcomes and mitigate risks. In marketing, predictive analytics helps identify customer preferences and behaviour, allowing for personalised campaigns and customer retention strategies (Al Dhaheri et al., 2024). Predictive analytics plays a crucial role in the travel, hospitality, and tourism industries by enabling businesses to anticipate trends, optimise operations, and enhance customer experiences. It is widely used to forecast demand, allowing dynamic pricing strategies to maximise revenue. For example, Expedia uses AI to predict room availability and optimise pricing. In the airline industry, predictive analytics helps anticipate passenger load, adjust pricing dynamically, and optimise route planning, maximising profitability (Chong et al., 2024). In hospitality, hotels use predictive tools to manage inventory and personalise guest experiences by determining room pricing based on local events, seasonal demand, and competitor activity. Tour operators utilise predictive analytics to tailor travel packages and recommend destinations by analysing traveller behaviour, booking patterns, and reviews (Agrawal et al., 2018). Additionally, destination management organisations (DMOs) leverage predictive analytics to understand tourist preferences, optimise marketing campaigns, and manage crowd control in popular areas. Predictive analytics empowers businesses in the travel, hospitality, and tourism sectors to make data-driven decisions, adapt to changing consumer demands, and improve operational efficiency.

3.3.   Role of Robotics and Automation

The result shows the role of Robotics and Automation (Table 1). Robotics and automation have become integral to modern business operations, driving efficiency, reducing costs, and enhancing productivity across various sectors (Kedi et al., 2024). Robotic systems are widely used in manufacturing for assembly lines, quality control, and packaging. Robotics and automation are transforming the travel, hospitality, and tourism industries by streamlining operations, enhancing customer service, and reducing operational costs (Bogue, 2018). In the hospitality sector, robotic concierges provide guests with personalised and efficient information about local attractions and hotel amenities. Hotels, especially in Japan, use robots for check-in, luggage handling, and room cleaning, reducing the reliance on human labour while enhancing operational efficiency. In the travel industry,

airports adopt automation technologies such as robots for baggage handling and automated kiosks for self-check-in and security, significantly reducing wait times and improving passenger experiences (Ivanov & Webster, 2019). Airlines also employ robotic assistants at boarding gates to guide passengers and provide real-time flight updates, further optimising travel. Tourism attractions, including museums and theme parks, use interactive robots to guide visitors and provide multilingual explanations, enriching the visitor experience. Additionally, robots are deployed in food and beverage services at tourist hotspots, ensuring faster and more consistent service delivery (Luo et al., 2019). These applications demonstrate how robotics and automation are revolutionising the travel, hospitality, and tourism industries by improving service delivery, optimising resources, and enhancing overall customer satisfaction.

3.4. Role of Natural Language Processing (NLP)

The systematic literature review revealed the role of Natural Language Processing (NLP) (Table 1). Natural Language Processing (NLP) transforms business operations by enhancing decision-making, automation, and customer engagement (Al Dhaheri et al., 2024). In customer service, NLP powers chatbots and virtual assistants like IBM Watson Assistant, improving response times and reducing operational costs while handling customer inquiries. In marketing, NLP enables sentiment analysis, allowing businesses to gauge customer opinions from social media and online reviews, which informs their strategies. Natural Language Processing (NLP) is transforming the travel, hospitality, and tourism industries by enabling seamless communication, personalisation, and data analysis. NLP-powered chatbots and virtual assistants are central to customer service, handling inquiries, booking requests, and complaints in multiple languages, providing a personalised and efficient service experience. Platforms like Booking.com and Expedia use NLP to analyse customer queries and suggest tailored travel options. In hospitality, NLP enhances guest experiences through sentiment analysis of online reviews on platforms like TripAdvisor and Google Reviews, helping businesses improve their offerings (Oldemeyer et al., 2024). Additionally, voice-activated assistants like Amazon Alexa and Google Assistant are integrated into smart hotel rooms, allowing guests to control room settings, request services, and obtain travel information through natural language commands. NLP also powers translation tools like Google Translate, which is crucial for breaking language barriers between tourists and local service providers. This is especially important for tour operators managing international visitors. Furthermore, destination management organisations (DMOs) leverage NLP algorithms to analyse

social media data, identify trends, and enable targeted marketing campaigns, enhancing real-time engagement with travellers (Grashof & Kopka, 2023). These applications demonstrate how NLP enhances communication, personalises services, and drives data insights, significantly improving efficiency and customer satisfaction in travel, hospitality, and tourism.

3.5. *Role of Image and Video Recognition*

Image and video recognition technologies have become essential across various business sectors, enhancing productivity, security, and customer experiences. In manufacturing, video recognition systems are used for quality control, identifying defects in real time to ensure consistent production standards (Sotamaa et al., 2024). In security, facial recognition and video monitoring detect unauthorised access and track real-time events, enhancing safety measures. Image and video recognition technologies are transforming the travel, hospitality, and tourism industries by enhancing operational efficiency, improving customer experiences, and driving innovative marketing strategies. In the hospitality sector, facial recognition for check-ins, implemented by hotel chains like Marriott and Hilton, enables contactless, secure guest registration, streamlining the process. In tourism, image recognition applications allow tourists to identify landmarks and learn about historical sites or artworks through mobile apps like Google Lens, enhancing engagement and education. Video recognition is also employed in tourist attractions and museums for security monitoring and visitor management, ensuring safety while optimising operations. Additionally, travel companies use image and video recognition to analyse user-generated content on social media, identifying popular destinations and traveller preferences, which helps them create targeted marketing campaigns (Buhalis & Sinarta, 2019). Hotels and tour operators apply image recognition to analyse customer reviews by categorising visual elements like photos of amenities, food, and rooms, gaining valuable insights to enhance services. These technologies significantly enhance personalisation, streamline operations, and foster innovation, ultimately transforming how businesses interact with travellers and manage their operations in the travel, hospitality, and tourism sectors.

3.6. *Role of Virtual and Augmented Reality (VR/AR)*

Virtual and Augmented Reality enhance user experiences in retail, real estate, and training programs (Fadhel et al., 2024). Virtual Reality (VR) and Augmented Reality (AR) are revolutionising the business landscape by creating immersive experiences, enhancing productivity and driving innovation (Gladysz et al., 2023). Virtual reality (VR), augmented reality

(AR), and mixed reality (MR) are transforming the travel, hospitality, and tourism industries by providing immersive and interactive experiences. VR allows potential tourists to explore destinations remotely through 360-degree virtual tours of landmarks, hotels, and attractions, aiding them in making informed decisions before booking trips (Rauschnabel et al., 2022). Hotels and tourism boards use VR to offer virtual walkthroughs of properties and attractions, enhancing decision-making and offering pre-trip experiences to those unable to travel due to financial or physical constraints. AR, on the other hand, enriches real-time experiences by overlaying digital content onto the physical environment, allowing tourists to access detailed information about historical sites, monuments, and landmarks via smartphones or AR glasses (Loureiro, 2020). This technology is particularly effective in enhancing guided tours with interactive content, such as historical reconstructions or contextual data, making the experience more meaningful and educational. Mixed reality (MR) combines elements of VR and AR to offer highly interactive and personalised experiences. For example, MR is used in the hospitality industry to provide virtual concierge services, where guests can interact with holographic staff representations or explore hotel amenities and nearby attractions. It is also utilised in themed resorts and entertainment destinations to create dynamic, engaging environments that adapt to guest preferences. As technology advances, MR is expected to make tourism experiences more accessible, interactive, and personalised.

4. DISCUSSION

The integration of advanced technologies such as chatbots, the Internet of Things (IoT), predictive analytics, natural language processing (NLP), robotics and automation, and immersive technologies like VR, AR, and MR is transforming the travel, hospitality, and tourism industries (figure 1). These innovations revolutionise customer experiences, enhance operational efficiency, and drive data-driven decision-making processes.

Chatbots have become essential in travel and hospitality, enabling 24/7 customer service and personalised interactions. Tussyadiah et al. (2017) supported and mentioned that these AI-driven virtual assistants handle real-time inquiries, booking requests, and complaints, significantly improving customer satisfaction while reducing operational costs. Platforms like Booking.com and Expedia leverage chatbots to streamline the booking process and provide tailored travel recommendations. Chatbots ensure quick and accurate responses by analysing customer queries and enhancing the overall user experience (Luo et al., 2019). IoT technologies are fostering more intelligent and more connected environments in travel and hospitality.

Smart hotels integrate IoT-enabled devices such as smart thermostats, lighting, and keyless entry systems to offer personalised and efficient guest experiences (Buhalis & Sinarta, 2019). Airports utilise IoT for real-time baggage tracking and efficient crowd management. For instance, sensors and IoT networks enable seamless check-ins and enhanced security processes, improving passenger flow and reducing wait times (Gretzel et al., 2020). IoT's ability to gather and transmit real-time data significantly enhances operational efficiency and customer convenience.

Predictive analytics is another transformative tool in these industries, enabling businesses to forecast demand, optimise pricing, and manage resources effectively. Airlines utilise predictive models to anticipate passenger load, adjust pricing dynamically, and optimise route planning, maximising profitability (Gretzel et al., 2020). Similarly, hotels employ predictive analytics to set room rates based on seasonal demand, local events, and competitor pricing, ensuring higher revenue per available room (Buhalis & Leung, 2018). Tour operators also use predictive tools to analyse booking patterns and traveller preferences, enabling them to tailor packages and offer personalised services (Morosan & DeFranco, 2016).

NLP technologies significantly enhance communication and personalisation in the travel, hospitality, and tourism industries. Chatbots and virtual assistants powered by NLP handle customer inquiries in multiple languages, offering personalised and efficient services. Platforms like TripAdvisor and Google Reviews leverage NLP for sentiment analysis to gain insights into customer perceptions and improve service offerings (Gretzel et al., 2020). Additionally, voice-activated assistants like Amazon Alexa integrated into hotel rooms allow guests to control room settings and access travel information through natural language commands (Buhalis & Leung, 2018).

Robotics and automation are streamlining operations and improving service quality in these industries. Hotels in Japan, for example, use robots for check-ins, luggage handling, and room cleaning, reducing reliance on human labour and enhancing efficiency (Tussyadiah et al., 2019). Airports deploy robotic assistants for baggage handling and automated kiosks for check-ins and security, reducing wait times and improving passenger experiences (Buhalis & Sinarta, 2019). Additionally, tourist attractions and museums use interactive robots to guide visitors and provide multilingual explanations, enriching the visitor experience (Ivanov & Webster, 2019). Immersive technologies like VR, AR, and MR transform travellers' engagement with destinations. VR lets tourists explore destinations remotely through 360-degree virtual tours of landmarks, hotels, and attractions, helping them make informed decisions before booking trips (Pine & Gilmore, 2019). AR

applications overlay digital content onto physical environments, enhancing real-time experiences. For example, tourists can use AR to access information about historical sites and monuments through their smartphones, making guided tours more interactive and educational (Javornik, 2016). MR combines elements of both VR and AR to create highly interactive experiences, such as virtual concierge services in hotels and dynamic environments in themed resorts (Bacca et al., 2014). These immersive tools enhance customer engagement and make travel experiences more accessible and personalised
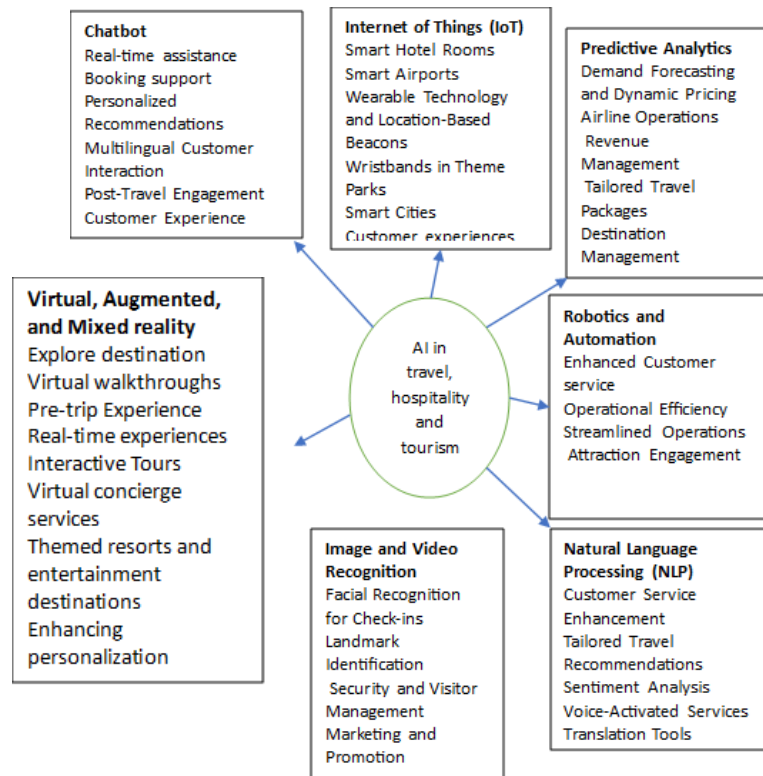

Figure 1: Role of AI in Travel, Hospitality, and Tourism
Source: Author's own

5. IMPLICATIONS

The findings of this research carry significant implications for academia, industry practitioners, and policymakers. By systematically scrutinising and compiling empirical studies on AI applications, the research provides a comprehensive overview of the current state of AI adoption and its transformative potential across various sectors. For the business sector, exploring AI's role highlights how organisations can leverage AI

technologies to enhance operational efficiency, improve decision-making, and drive innovation. These insights can assist business leaders in developing strategies to integrate AI into their operations while addressing potential challenges such as workforce adaptation and ethical concerns. In the context of travel, hospitality, and tourism, the study sheds light on the potential of AI to personalise customer experiences, optimise resource allocation, and improve service quality. Industry practitioners can utilise these findings to design AI-driven solutions that enhance customer satisfaction and foster competitiveness in a rapidly evolving market. Finally, the research underscores policymakers' need to create supportive regulatory frameworks and infrastructure to facilitate AI adoption while ensuring data security, privacy, and equitable access to technology. This will enable businesses and industries to harness AI's potential responsibly and sustainably, contributing to economic growth and societal well-being.

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