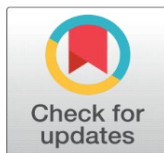# NEXT DYNAMICS IN DESIGNING ARTIFICIAL INTELLIGENCE TO SUPPORT TOURISM DEVELOPMENT

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ABSTRACT

This study advocates for the integration of artificial intelligence (AI) in the tourism industry. It synthesizes literature to comprehensively examine this concept, emphasizing the importance of tourist satisfaction and industry development. The study pursues two main objectives: elucidating AI's workings and analyzing its application in tourism. Employing a descriptive methodology, it gathers secondary data from diverse sources. The findings highlight the potential benefits of AI implementation in policy, strategy, and operational aspects of tourism. Moreover, it underscores the importance of AI education for stakeholders, including institutions, policymakers, and tour management teams, to leverage cutting-edge technologies effectively.

This paper is an endeavour to shed light on the specific ways AI is utilized within the tourism sector, offering insights that can inform industry practices and academic discourse.

This research contributes to the discourse on AI's role in enhancing tourism experiences and industry efficiency, offering insights for future strategies and implementations.

Keywords: Tourism, Artificial Intelligence, Working Mechanism, AI Application, Augmented Reality & Virtual Reality

1. INTRODUCTION

The fourth industrial revolution (IR) diverges from its predecessors by emphasizing the utilization of online interactive platforms to bolster economic prosperity McKinsey (2022), Schwab (2023), Delera (2021), WEF. (2016). Artificial intelligence (AI) stands out as a pivotal technological innovation poised to address challenges and enhance economic sustainability in tourism development Rane et al. (2023), Barten (2024), Basumatary & Sarma (2024). Chatbots (e.g., Generative Pre-Trained Transformer, Gemini, Alexa, Siri) augment service efficacy through language translation Alyasiri et al. (2024), Ukpabi et al. (2019), Irfan & Muley

(2023), Scarpi (2024) and other machine learning applications in data processing and analysis Afsahhosseini & Mulla (2020), Seker (2023). AI intervention has significantly bolstered economic sustainability across industries Ernst et al. (2018), Devang (2023), warranting its incorporation into decision- making processes and policy applications within the tourism sector Majid et al. (2023), Patel et al. (2021), Irfan & Muley (2023). Moreover, encouraging investment in AI for industrial development is crucial Koteshov (2024), PTI. (2023), as it accelerates growth within tourism industries Островська et al. (2023), Herrera et al. (2023), rendering operations more dynamic and cost-effective Perifanis & Kitsios (2023), Gupta et al. (2023). Consequently, AI adoption leads to enhanced economic viability Haefner et al. (2021) and competitiveness Kim et al. (2024), Tussyadiah (2020), Giner et al. (2022). From the above discussion, we could at least infer AI as a fundamental element in navigating the complexities and dynamics of tourism operations, contributing significantly to the sector's vibrancy and efficiency.

2. STUDY BACKGROUND

Tourism plays a pivotal role in economic sustenance, necessitating the integration of AI to enhance industry intelligence and efficiency. This study underscores AI's foundational qualities such as impartiality, diligence, cost-effectiveness, versatility, competitiveness, customized usage, and near-perfect recommendations as key competitive advantage tools in tourism Aldoseri et al. (2023), Ray (2023). AI's capacity to provide precise and comprehensive explanations enhances industry attractiveness and profitability. Additionally, AI functions as a harbinger of futuristic tourism Gupta et al. (2023), emphasizing the imperative for industries to master its application for growth Indaryanto et al. (2023), Zhang & Sun (2019), Saxena (2021), Wörndl et al. (2020). The study's background inherently addresses various challenges and proposes ethically and universally acceptable solutions. Furthermore, AI's support for ethical considerations is another crucial aspect that bolsters its significance in the tourism sector.

3. REVIEW OF LITERATURE

Knani et al. (2022) conducted a bibliometric review employing descriptive statistical methodology to examine AI's impact on tourism industries. They identified forecasting models, augmented reality, and virtual reality as major themes. Madurga & Méndez (2023) synthesized the literature on AI's impact on tourism using a descriptive methodology, yielding convincing results regarding AI solutions. Sharma et al. (2023) illustrated AI's significant contribution to the industry through IoT, smart mobile technology, and apps. Chi et al. (2020) addressed AI's role in tourism delivery systems, highlighting social influence's significance in hospitality versus airline services. Kumar et al. (2021) conducted comprehensive research on AI and robotics' impact on tourism, analyzing applications, employment effects, future trends, and job opportunities. Tong et al. (2022) advocated for AI implementation in tourism departments, utilizing purposive sampling methods. However, Samala et al. (2022) cautioned that AI cannot surpass human touch. Grundner & Neuhofer (2021) evaluated AI as a transformative technology, examining its positive and negative impacts and proposing comprehensive AI solutions. Gidumal et al. (2023) investigated AI provision to stakeholders' profit orientations using descriptive methodology and probability sampling, enhancing stakeholder engagement. Verma et al. (2022)

conducted a systematic literature review on tourist experiences with augmented reality (AR) and virtual reality (VR), stressing the importance of device interaction for tourism development. Conversely, Deranty & Corbin (2024) argued that AI may shift full-time employment norms towards part-time with multiple job engagements. Zsarnoczky (2017) discussed AI's potential in tourism industries, anticipating future implementation due to its effectiveness and efficiency. García & Grilló (2023) emphasized AI's transformative catalyst role, advancing industry development through a comprehensive overview of review methodologies. These studies collectively contribute to understanding AI's multifaceted impact on tourism industries, ranging from technological innovation to societal and economic implications. While extensive research exists discussing AI's impact on tourism, it's notable that no definitive study has thoroughly investigated AI's application in tourism industries. In light of this observation, we aim to address this gap and contribute to the body of research by synthesizing relevant literature and delineating the objectives of our study. Through this endeavour, we seek to shed light on the specific ways AI is utilized within the tourism sector, offering insights that can inform industry practices and academic discourse.

4. OBJECTIVES

1) To describe the working mechanism of AI concerning tourism industries;
2) To examine existing gaps in AI systems and forward feasible AI-related solutions in fostering the development of tourism industries.

5. METHODOLOGY

Amidst a growing body of literature and research on AI's impact on tourism, there remains a notable gap in understanding how AI is implemented and applied within the industry. This study aims to address this gap by exploring the operationalization of AI in tourism and its practical applications, aiming to enhance industry efficacy. By comprehensively examining AI's working mechanisms and its potential to improve performance, this research seeks to contribute to filling this research void. It will investigate AI applications from both tourist and stakeholder perspectives, aiming for a holistic understanding of its impact on the tourism sector. This study advocates for the development of well-structured and systematic policies tailored specifically for AI integration in tourism. Additionally, it emphasizes the importance of aligning AI decisions with policy objectives to enhance effectiveness. To address these objectives, a descriptive methodology will be employed, involving the collection of secondary data from various sources such as books, websites, articles, and reports.

6. WORKING MECHANISM OF AI FOR TOURISM

To make the study more interesting, we aim to delve into the operational mechanisms of AI tailored specifically for the tourism industry. The study aims to explore the operational mechanisms of AI specifically within the context of tourism industries, leveraging various sources of data such as big data, social media, internet platforms, and reports from reputable institutions Chew & Gunasekeran (2021), Rahmani et al. (2021), Rahman & Reza (2022).
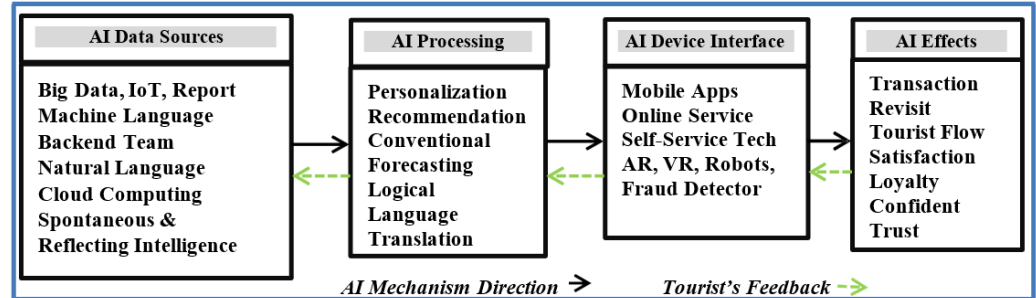
Figure 1

Figure 1 Working Mechanism of AI for Tourism Industries
Source Author's Compilation

Notably, AI possesses remarkable capabilities to extract information from diverse sources including newspapers and social media blogs Pichai & Hassabis (2023), and even video recordings or documentaries Goodwin (2024), Darbinyan (2022). The integration of cloud computing and Internet of Things (IoT) technologies allows for the measurement of tourist experiences, with cloud computing serving as a pivotal technology for data retention and storage Xu (2018). Understanding tourist demands and expectations is crucial, and AI's proficiency in processing vast amounts of data from databases is indispensable for personalized service delivery Gidumal (2022). Tourists often express negative experiences more prominently, underscoring the importance of addressing and resolving issues promptly Mellinas et al. (2023), Kozak & Tasci (2006), Hien et al. (2022). Utilizing frameworks such as the Maslowian triangle proposed by Zimik & Barman (2024) can personalize AI interactions, although such personalization may present challenges in decision-making processes regarding destination descriptions. Effective AI implementation necessitates robust backend operations focusing on language processing and intelligence enhancement Xu et al. (2021), facilitating automated responses to tourist queries and issues, thereby enhancing customer relationship management (CRM) Gidumal et al. (2023). AI serves as the preferred search engine for tourists, necessitating continual analysis and cross-checking to ensure the fulfilment of tourist expectations Mingotto et al. (2020), Jewell (2018), Collett et al. (2022). Prompt response times and efficient alternative solution generation distinguish AI from manual searches, with AI operations exhibiting above- average speed and responsiveness Subramaniyan et al. (2021), Alahi et al. (2023), Dhamija & Bag (2020). Tracking and analyzing tourist expectations and selections are critical for tailoring AI responses effectively, enhancing tourist satisfaction and experience. The AI process section serves as the powerhouse of personalized and logical algorithm development, offering diverse alternative solutions while adhering to legal and ethical considerations Sarker (2022), Glover (2024), Jarrahi et al. (2023). Customization, recommendation, logical reasoning, forecasting, and language translation are fundamental aspects of AI processes, aligning with tourist psychology and stakeholder perceptions to deliver optimal outcomes. AI interfaces play a pivotal role in engaging tourists, offering tangible and intangible experiences that enhance convenience and meet expectations Chi et al. (2020), Shariffuddin et al. (2023). Tangible AI interfaces such as robots streamline operations, reduce human effort, and address multiple issues seamlessly Koo et al. (2021), contributing to the physical evidence component of the marketing mix Miao & Yang (2023) serving as the key marketing product component Yusuf et al. (2020), Asiegbu et al. (2012). The integration of AI technologies, including augmented

reality (AR), virtual reality (VR), online apps, and IoT, empowers tourists with detailed information at their fingertips Nayyar et al. (2018), Yatchenko (2024). Self-service technologies facilitated by AI enable tourists to participate voluntarily, enhancing efficiency and resourcefulness Lu et al. (2021), Safaeimanesh et al. (2021), Chen et al. (2021). Moreover, AI interfaces alleviate fear and confusion among tourists by delivering clear and genuine information, fostering confidence in decision-making Carpio (2023). Cost-effectiveness coupled with efficiency positions AI as the preferred technology for tourists seeking recommendations, surpassing traditional word-of- mouth referrals Huang et al. (2021). The study also explores tourist reactions and possible outcomes, including increased inflows, revisits, satisfaction, loyalty, transactions, and trust (Figure 1). Understanding AI system directions, along with tourist feedback and rectification measures, is crucial for enhancing AI performance and efficiency. Thus, the research endeavours to elucidate the multifaceted dynamics of AI's role in tourism, aiming to enhance industry practices and customer experiences.

7. NEW CONSTRUCTS FOR AI APPLICATION IN TOURISM

Figure 2

Figure 2 AI Application in Tourism Industries
Source Author's Construct

Figure 2 aims to provide an overview of AI's impact on the tourism industry. It is important to note that the implementation of AI interventions may vary depending on factors such as destination, age group of tourists, class category, background, and psychology.

- **Customising AI for Use:** The earlier work by Zimik & Barman (2023) stated that the Maslowian triangle focuses on delineating tourist expectations, ranging from basic needs to higher hierarchical desires. Each level of this hierarchy influences the relevance and impact of AI, necessitating a thorough examination in light of tourist expectations and requirements. It could be argued that AI's impact becomes more pronounced as one ascends the hierarchy. Tourist preferences and tastes can be stored based on past destination selections, psychological factors, budget constraints, environmental considerations, and available offers. AI's

role lies in providing detailed information and making decisions based on these tourist requirements. Achieving logical alignment between AI responses and tourist expectations is paramount Samara et al. (2020), Madurga & Méndez (2023). Additionally, AI can leverage past experiences to recommend destinations with optimal offers, while also suggesting opportune timing for destination selection Grundner & Neuhofer (2021), ET. (2023), Bassett (2023), Weed (2023). By offering alternative responses from both personalized and general perspectives, AI facilitates a more efficient approach to planning and analysis for tourists. Despite the rich potential of AI in tourism, a comprehensive investigation into its customized impact remains scarce. This study aims to fill this gap by organizing rich data into rational algorithms to draw meaningful findings.

- **Designing SMART approach:** One distinctive attribute of AI is its capacity to integrate insights from multiple disciplines, facilitating the extraction of meaningful explanations. As exemplified by advancements in augmented reality (AR) and virtual reality (VR) technologies, AI empowers tourists to become more discerning and informed consumers, enhancing destination appeal and trend visibility. Tourists aspire to fully immerse themselves in destination experiences, a goal facilitated by AI's ability to augment offers and precisely identify appealing regions. Consequently, tourists benefit from increased confidence, accessing comprehensive information with minimal effort or guidance, thereby enhancing their intelligence and decision-making prowess through AI assistance. Furthermore, the role of policymakers and various stakeholders in tourism is pivotal, particularly in fostering a constructed environment (CE) conducive to sustainable tourism development Zimik & Barman (2021), Zimik & Barman (2023), Zimik & Barman (2024), Zimik & Barman (2023). CE fosters collaboration among stakeholders, aligning efforts toward effective approaches in the tourism industry. This underscores AI's prominence and effectiveness in analyzing and understanding stakeholders' perceptions, contributing to industry development. CE concepts furnish AI with cutting-edge insights, rendering it more adept and responsive to tourist needs while nurturing stakeholder relationships. Additionally, AI mitigates obstacles such as language barriers and cumbersome formal procedures, streamlining interactions and enhancing tourist satisfaction.

- **Ensuring Security and Dependability:** The personalized nature of AI enables tourists to adhere to their medication schedules, facilitating real-time monitoring. Moreover, AI applications provide tourists with insights into digital transactions and transportation modes at destinations. AI interventions offer detailed descriptions of destinations, including footfall, climate, traffic conditions, and ambience. With its logical precision and predictive capabilities, AI emerges as a reliable tool for predictive analysis, enhancing safety measures in collaboration with travel advisors Dinkoksung et al. (2023). Notably, AI's responsiveness to tourist queries and challenges is evident through chat box responses and the provision of contact person details, underscoring its reliability in issue resolution. Additionally, AI-driven data analysis aids decision-making processes by providing information on transportation options, budget assessments, safety measures, and destination promotion, thereby attracting more tourists Tymoshchenko (2024). Biometric devices integrated with AI technology contribute to tourist security and safety measures, while CCTV

installations at destinations ensure organizational well-being and operational efficiency. These features collectively highlight AI's multifaceted role in enhancing tourist experiences and destination management.

- **Minimal Expense:** It is worth noting that AI plays a crucial role in facilitating budget management, price comparison, personalizing and recommending offers, and maintaining proper expense records for both tourism management and tourists. These categorical features underscore AI's significance in the tourism sector. Given the multifaceted nature of tourism industries and the contributions of various stakeholder groups, the adoption of AI has become imperative. Simulation and augmentation features of AI enable stakeholders to assess alternative options and select the most suitable ones Ozkul & Kumlu (2019). Policymakers benefit from AI recommendations in addition to traditional brainstorming and policy formulation processes Lahti (2023), Lavrič & Škraba (2023), Habib et al. (2024). AI intervention optimizes operational and supply chain management, enabling the examination of various models for feasibility and requirement analysis. AI's robust data analysis capabilities empower industries to identify optimal alternatives for cost management, emphasizing the importance of time, money, human resources, and machinery. Its strong logical reasoning and utilization of big data sources ensure the provision of ideal and effective solutions, making AI intervention indispensable for streamlining efforts and reducing costs in the tourism sector.

- **Excellence Data Analysis:** The advent of IoT has democratized access to vast pools of information, amplifying the importance of AI in distilling meaningful insights. Despite its underutilization in tourism, it is evident that the industry demands meticulous tracking of tourist behaviour, encompassing spending patterns, travel modes, duration of stays, demographic profiles, seasonal fluctuations, and managerial considerations such as market dynamics, risk assessment, revenue optimization, footfall analysis, historical failures, and activity trends. AI emerges as a potent solution to navigate past challenges and disasters, leveraging data from diverse sources including social media, blogs, and reviews to extract invaluable insights into tourist experiences. By harnessing AI techniques and tools, tourism industries stand to optimize operations, gain market traction, secure competitive advantages, and achieve excellence in performance. Notably, AI's forecasting capabilities empower stakeholders to proactively manage demand surges, infrastructure upkeep, supply chain dynamics, and policy formulation while aligning with perceived tourist expectations and addressing challenges, thereby enabling tourists to fulfil their bucket list aspirations and experience self-actualization.

It is inferred that AI employs various alternative methods to raise tourists' awareness and provide detailed insights into destinations. Increased reliance on online transactions enhances tourist safety by mitigating concerns associated with carrying hard cash. Additionally, the implementation of Six Sigma methodologies in the tourism industry can enhance performance. The realization of high expectations hinges significantly on effective AI applications, notwithstanding the industries' achievement of error-free and precise batch product production.

Given the intricacies of tourist psychology, AI intervention is genuinely sought to ensure tourists benefit comprehensively from all aspects of their experiences.

8. DISCUSSIONS FOR NEXT COURSE OF ACTION

The utilization of AI software yields outcomes that meet expectations and enhance the competency of management teams. It is essential to ascertain whether AI performance aligns with tourist demands and enhances industrial operations, despite its role in minimizing human effort and fostering economic growth. Analyzing the aftermath of AI operations in tourism can establish universally accepted principles. Presently, the business volume of tourism equals or surpasses that of other global industries, necessitating AI intervention and stakeholders' awareness of its positive impacts. Decision-making processes consistently incorporate policies, making AI an instant and essential feature. AI serves as a simulated experiment, saving time, costs, energy, and reputations, while enabling global connectivity and benchmarking strategies. This enhances system and destination intelligence and acceptability. A robust research contribution and backend team are essential to ensuring AI's effectiveness and applicability. Before visits, tourists seek detailed information about destinations, making it an ideal point for tourists to seek specialized experiences. The CE framework provides the best fit for industries and enables AI calibration for tourism. The incorporation of the Maslowian triangle into AI programming aids in auto-setting tourists' exact expectations, derived from Big Data. Addressing personalized tourist requirements within the triangle enhances their experience. AI retrieves data from primary sources and matches it with actual feasibility and requirements. The concept of AI proposes a personalized yet efficient data collection approach, facilitated by digitalization, transforming cities into smart entities. Coordinating every step through AI supports the collection of physical evidence.

9. CONCLUSION

In conclusion, our study underscores the vital importance of AI intervention in the tourism industry. We advocate for the development of a more competent and promising single platform capable of governing entire tourist trips while facilitating accessibility for various stakeholders and technological interfaces. Implementing concepts of Constructed Environment (CE) in tourism industries can significantly reduce human effort through processes like online booking and cancellation, enhance accountability, and facilitate information sharing among different departments. Leveraging technologies such as IoT, big data, and cloud computing can enable industries to engage with prospective audiences more intelligently. The involvement of AI in policy formulation, strategic planning, and operational management stands out as a key strategy to enhance industry performance. By enabling forecasting and offering alternative solutions, AI can streamline decision-making processes and provide a comprehensive view of industrial operations. Looking ahead, leading technology firms like TCS, Oracle, Microsoft, Infosys, and others must focus on developing solutions tailored to the needs of the tourism sector. Mobile apps should prioritize understanding tourist expectations and preferences, allowing AI to personalize recommendations based on past travel experiences and current destination feasibility. Through our study, we advocate for the widespread adoption of AI across education institutions, government bodies, policymakers, and tour management teams to cultivate expertise in cutting- edge technologies and drive innovation in the tourism industry.

CONFLICT OF INTERESTS

None.

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None.

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