

AI/Robotics in the Tourism and Hospitality Sector: Technological Realities and Imaginaries in the Ghanaian Context

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ABSTRACT

Global trends in the application of Artificial Intelligence and Robotics in the Tourism and hospitality sector indicate that AI and Robotics are infiltrating modes of service delivery in different ways and diverting attention from human-to-human interfaces and interactions to human and AI-aided technologies, especially in advanced economies. It is however noteworthy that, the scope and dimension of Artificial Intelligence and Robotic technologies in developed economies have a far-reaching impact on the technological realities and imaginaries of emerging economies, especially in Africa, where the knowledge divide and the gap between the developed and emerging economies may be wider. While the tourism and hospitality sectors of emerging economies continue to play a key role in economic development, technological realities, and imaginaries in the context of academic coverage are yet to be explored to ascertain trends, especially in Ghana. The objectives of this research were to determine the context of trends in academic publications on AI and Robotics applications in Ghana's tourism and hospitality sector, to appreciate existing technological realities and imaginaries, and also examine the challenges and opportunities. The approach used was an exploratory search and analysis of existing Ghanaian literature on the subject. Key findings indicate a huge gap in research in the area, suggestive of a lack of Ghanaian literature on the subject. Also, the study provides a context for research on the technological realities and technological imaginaries surrounding the emerging development and applications of Artificial Intelligence and Robotics in the Tourism and Hospitality industry. Moreover, the study provides a context for practitioners in the sector.

Keywords: AI/ Robotics, Tourism and Hospitality, Technological Realities, Technological Imaginaries

INTRODUCTION

The tourism and the hospitality sector have become a significant economic driver for many nations throughout the world, assisting in their economic growth and raising GDP. The dynamic economic sector and the world's third-largest export industry after fuels and chemicals, and food and automotive products, in 2022, contributed **7.6% to global GDP** and created **22 million new jobs** (World Travel and Tourism Council, 2023; Rasool, Maqbool, & Tarique, 2021). The industry has not only experienced economic growth but great transformation in technology adoption and application in service delivery. (Tussyadiah, 2020). Artificial intelligence (AI) and robotics which have become a phenomenon and global trend in the transformation of many sectors have infiltrated into health, education, engineering, transport, financial, tourism, and hospitality sectors of both developed and emerging economies. Abduljabbar, Dia, Liyanage, & Bagloee (2019) expressed Artificial Intelligence (AI) as the use of computer science that makes machines work like a human brain; therefore, requiring data or inputs by people to make predictions or decisions (Schuett, 2023; De Obesso, Rivero, & Márquez (2023).

The adoption of the AI and robotics in the various sectors has generated research and review in the sectors; health (Damoah, Ayakwah, & Tingbani, 2021; Botwe, Antwi, Arkoh & Akudjedu, 2021), education (Gyamfi, Dayie & Asiedu, 2022), Financial (Fernandez, 2019), engineering and tourism and hospitality (Bisoi, Roy & Samal, 2020). AI's presence in the travel, tourism, and the hospitality industry has evolved in most areas of operations; ticketing and reservations, review and recommending systems, voice and language translation systems (Bulchand-Gidumal, 2020). In this regard, Xiang (2020) asserted that the technological upliftment and the innovations of AI play an important in the tourism and hospitality sector, both in developed and developing countries.

The scope and the dimension of AI and Robotic technologies application in developed economies have impacted the technological imaginaries of developing economies, mostly in Africa where the knowledge gap between the developed and developing countries may be wider. In response to this Samara, Magnisalis, and Peristeras (2020) reiterated that though the application of AI, Robotics, and Imaginaries have impacted the activities of both customers and employees of the tourism and hospitality industry, research on these technologies have not been adequately explored. Hence, the quest to research AI-related technologies usage in tourism and hospitality to structure and understand the content of existing knowledge which may be a guide for future research (Molina-Collado, Gómez-Rico, Sigala, Molina, Aranda, & Salinero, 2022). On that basis, the study sought to assess the content of literature on AI and Robotics applications in the tourism and hospitality industry, specifically in Ghana. Also, the study considered the impacts, challenges, and opportunities in the use of AI.

LITERATURE

Adoption of AI in Tourism and Hospitality Industry

Various assertion has been made about the concept of AI. The concept itself has been attributed to many names such as Smart Tourism, Digitization, and Machine learning among others. AI has a wide scope of prospect of usage among various sectors of the economy, therefore the importance of understanding the usage or the application of Artificial Intelligence (AI) for businesses, especially tourism is not farfetched, considering the advancement of technology in this Information Age (Brobbe, Ankrah & Kankam, 2021). AI has progressively become part of our daily activities (Ferreira, Sequeira, Tokhi, Kadar & Virk 2015). However, the evolving of technology in the usage of information technology, internet websites, and applications which have helped with the interactions and collaborations among users, have led to the upsurge of technological use in the entirety of the tourism value chain (Popescu, 2019).

The travel, tourism, and hospitality industries have progressively adopted the use of AI in different areas of the sector including hotels, airports, tourist destinations, and attractions among others. Likewise, AI technologies and facilities like robots and service automation in the form of chatbots, delivery robots, robot-concierge, conveyor restaurants, self-service information, check-in and -out kiosks, and many others are utilized in the industry (Ivanov & Webster 2017). In addition, automated control gates, biometric ID card readers, food and beverage vending machines as well and fully automated hotel doors are adopted. However, they achieved varying degrees of success (Kuo, Chen, & Tseng, 2017) among the developed and developing countries.

In the same vein, the adoption of the technologies or digitization in some jurisdictions or businesses is slow, while others are not near adoption or lacking (Ozdemir, Dogru, Kizildag & Erkmén, 2023). This slow adoption can be associated with developing countries, such as Ghana where investment in these technologies can be inadequate. Also, the industry's service-centric characteristic make it aligned to human touch (Ozdemir, Dogru, Kizildag & Erkmén, 2023) rather than technologies. The adoption of AI technologies and assistants in the tourism and hospitality industry of Ghana can be identified in the areas of

biometric card readers automated control gates, check-in and out kiosks, and other non-complex technologies as compared to the robot-oriented services which are common among the developed countries.

Benefits of AI to the Tourism and Hospitality Industry

The development and adoption of AI, robotics, and imaginaries can have a significant effect on the activities of businesses and institutions concerning customers, employees, and society as a whole (Koo, Xiang, Gretzel, Sigala, 2021; Belanche et al., 2019). These impacts are essential, especially with the tourism and the hospitality industry where the human touch is prioritized, because of its service-oriented nature. However, the benefits attached to the usage of AI and its related technologies cannot be overlooked. The benefits can be financial and value creation to users and the operators of AI technologies.

AI value creation for the tourism industry enhances travelers' experiences (Buhalis and Sinarta, 2019). For Samala, Katkam, Bellamkonda, & Rodriguez (2020) AI and imaginaries enable travel agents to market their travel services that are computerized and personalized which makes travel arrangements easier for tourists and travelers. Therefore, offering travelers personalized services and experiences. On the same pivot, the application of AI through imaginaries creates an appetite for travel among potential and actual tourists, as they strive to satisfy their innate desire which has been cultivated with virtual experiences (Koo, Xiang, Gretzel, Sigala, 2021). Human-associated mistakes in the performance of tasks can also be reduced in the adoption of AI, and these tasks are done with speed, as well as undertaken around the clock (Belanche et al., 2019) which may be burdensome for employees.

Adding to the benefits accrued to the adoption of AI is the preservation of the culture and historical heritage in the tourism and hospitality industries (Koo, Xiang, Gretzel, Sigala, 2021) through the use of imaginaries and automation people experience the traditions of places without human touches and contacts of these heritages. Though, arguments are made for human contact in the tourism industry, quality and flawless service delivery will be much preferred, which can be achieved through the use of AI (Kuo, Chen, & Tseng, 2017), thereby enhancing the operations of tourism businesses. However, differences in the operations of businesses adopting AI and those averse to AI can generate competition in the tourism industry; affecting consumers choice and attitudes towards these businesses which may be to their advantage or disadvantage (Van Doorn et al., 2017; Jabeen, Al Zaidi, & Al Dhaheri, 2022). One double standard positive effect of AI implementation is the reduction of high labour cost, which characterizes the recruitment of labour for the industry. Concerning cost also is the flexibility of the working hours of employees to allow for breaks, which are avoided in the usage of AI which can be operated for more hours. In this regard, Raisch & Krakowski (2021) considered AI as a counterpart or substitute for employees and even managers, solving the concerns of hiring and firing incompetent or casual employees.

Challenges associated with the use of AI

Despite the hype for the implementation of AI technologies, the perceived and empirical benefits associated with it and, the challenges with their usage cannot be overlooked. However, the challenges may vary based on the scope of technological adoption in a particular economy or business. The implementation of imaginary destinations and robotic activities can easily be adopted and implemented in developed countries like Japan, South Korea, the USA, and the UK than in Ghana, Nigeria, and Kenya (World Economic Forum's 2017 Global Information Technology Reports).

One common challenge in the adoption and implementation of AI is the investment cost involved. The cost content can include the acquisition of the instruments or gadgets, installation cost, and cost for hiring and training of operators and employees. All these expenditures are needed to ensure the smooth setup and efficient running of the technologies to benefit firms in the tourism and hospitality industry. These costs involved in the implementation of AI technologies may be huge and vehemently hinder their adoption by

travel and tourism businesses especially in emerging economies (Sharma, Luthra, Joshi & Kumar, 2022) like Ghana.

Diversity among tourists and their needs requires varied tourism products and services. As such the adoption and the promotion of AI will be much accepted by technology-savvy tourists as compared to technology-averse tourists who may not be enthused about the use of these services. Therefore, the rate of reception of customers to a service is important to implementation. On this background, Ivanov and Webster (2020) stressed the acceptance and implementation of AI technologies require attention to customers' needs and reactions; consequently, affecting the adoption of AI applications late in the tourism and hospitality industry. Hence, the mindset of individuals, organizations, and destinations must be penetrated with these technologies before investment and implementation (Gretzel, 2021). To Ozdemir, Dogru, Kizildag, and Erkmén (2023), the idea of human touch in the tourism industry is overemphasized which hindering the easy admission of these technology services processes which is progressively becoming a global trend.

Among the fears in the adoption and implementation of AI technologies is the vulnerability of people and tourists to information theft or cyber technology issues which has become a canker globally. Likewise, issues of the spread of computer viruses and interruptions with cloud computing (Pan, Lin, Liang, Akyildiz, & Park, 2021). With the use of AI, data is collected which are personal and sensitive; highlighting people's concerns with breaches, surveillance, and misuse of collected data, affecting the usage of these AI technologies in the tourism industry (Muller, 2020). Hence, robust security measures need to be ensured with data protection to attract and maintain people's trust and acceptance.

According to Peng (2017), the use of AI assistance technologies encounters many service failures which occur with or sometimes without trained operators of the applications. As it pertains to machined-led operations, these technologies are data-fed and programmed to operate. As such the outcomes are based on what the application was fed with, associating the system with an inflexibility in problem-solving in a diverse tourist needs (Huang & Rust, 2018).

METHODOLOGY

This is a conceptual paper in which the authors assessed the AI efforts in the Tourism and Hospitality industry with a particular interest in value creation, challenges, and the trends of AI. A total of fifty (20) studies from 2017 to 2023 were assessed taking into consideration the country of publication, the focus of the study, and findings. The focus was on existing Ghanaian literature on AI-related technologies especially. The literature was accessed from Google Scholar, Emerald, Taylor and Francis, and Springer. The inclusion standards were research articles that specifically relate to AI in the tourism and hospitality industry, likewise published in English. Content Analysis was employed in analyzing the data.

FINDINGS AND DISCUSSION

Author	Country of Publication	Focus of the study	Findings from the study
Samala, Katkam, Bellamkonda Rodriguez (2020)	India	Highlights the different technologies being used and will be used in the future in the tourism industry.	AI certainly enhances tourism experiential services; however, it cannot surpass the human touch which is an essential determinant of experiential tourism

Jabeen, Al Zaidi, and Al Dhaher (2022)	United Arab Emirate	Identify and prioritize the key factors in automation and artificial intelligence (AI) implementation in the hospitality and tourism industry	Human knowledge, services, and robotics applications were the most significant factors influencing automation and AI implementation
Adams (2019)	Ghana	Digital activities undertaken by leisure tourism in Ghana	Digital chatting, digital gaming, watching movies, listening to music, and social networking were the main digital leisure activities. However, concerns on digital leisure: cost, poor digital infrastructure and safety concern
Goel, Kaushik, Sivathanu, Pillai & Vikas (2022)	India	Considered the extant existing research on consumers' adoption of artificial intelligence and robotics (AIR) in the hospitality and tourism sector	Identified four major barriers, namely, psychological, social, financial, technical, and functional that hinder the consumer's adoption of artificial intelligence and robots in the hospitality and tourism industry
Ly, Liu, Luo, Liu, & Li (2021)	China	Service failure caused by artificial intelligence assistant and how to recover them through cute appearance, cute voice, and cute language style of artificial intelligence assistant	There is a positive effect of the cuteness design of artificial intelligence assistants on customer tolerance of service failure
Tussyadiah, (2020)	UK	Review of research priorities on intelligent automation in tourism	Four areas were identified: designing beneficial artificial intelligence, facilitating adoption, assessing the impacts of intelligent automation, and creating a sustainable future with AI systems.
Lettu, Kofie & Allotey (2017)	Ghana	Explore the use GIS to enhance tourism information packaging, promotion, and development in Ghana using the Jomoro district as a case	It presented a pictorial view showing the interrelationships space such as transportation networks, settlements, and other natural resources for tourism packaging.
Kirtil & Aşkun (2021)	Turkey	Review of research trends in tourism AI	The study identified the most productive authors, collaboration institutions, and research hotspots in Tourism research on AI
Stroumpoulis, Kopanaki, & Varelas (2022)	Greece	It examines the use and impact of artificial intelligence (AI) and big data analytics in the tourism industry	It showed that the adoption of AI enables tourism companies to increase their business performance, achieve economic results, and potentially attain a sustainable competitive advantage

Koo, Xiang, Gretzel, & Sigala (2021)	Korea	Review of papers on Artificial intelligence (AI) and robotics in travel, hospitality and leisure	Provided constructive discussions on the value of new AI technologies from consumer and business perspectives.
Lu (2019)	Vietnam	Identify the demand for AI in hotels in Ho Chi Minh City, Vietnam through customers' points of view	Respondents preferred AI for its always-on service, fast access to service, and cleanliness
Popesku (2019)	Serbia	Discusses the artificial intelligence applications in tourism and its implications.	AI enables the personalization of tourism offers, improves operations, increases productivity, and delivers consistent product quality. However, AI lacks personalized service
Preko, Amoako, Dzogbenuku, & Kosiba (2023)	Ghana	Assess the digital tourism experience for tourist site revisit from an emerging market perspective.	The results of the study showed a great influence of AI technologies on tourists' revisit intention and the image of the destination. Likewise, the sharing of tourists' experiences through technology.
Osei, Mensah & Amenumey (2018)	Ghana.	Assess the use of social media in the travel decision-making of international tourists in Ghana.	The study revealed that the social media platform often used by tourists was Facebook and Google map. And less use of Twitter and TripAdvisor
Limna (2022)	Thailand	Aims to evaluate the literature on AI in the hospitality industry.	AI improves customer service, expand operational capability, and lower costs. Also, there are risks with AI such as job loss, loss of control, safety, security, and privacy issues
Wang, Zhang, Huang & Li (2023)	China	The study investigates consumer resistance to hotel front-desk service robots	The results identified eight barriers to using service robots such as the risk of malfunction, complexity, usage barrier, lack of warmth, unattractive appearance, flexibility, communication, and stiff barriers
Ivanov & Webster (2017)	Bulgaria	Assessed the cost-benefit analysis of adopting robots, artificial intelligence and Service automation by travel, tourism, and hospitality companies	Adoption of robots, artificial intelligence, and service automation is dependent on labour and technology costs, customers' readiness and willingness to be served by a robot, and cultural characteristics of both customers and service providers
Dayour, Adongo et al. (2023)	Ghana	Examined the benefits and challenges associated with the use of ICT among SMEs within the hospitality and tourism industry in the Northern Region of Ghana	The adoption of ICT leads to the growth and sustainability of business in the sector. However, abuse, insecurity, and high cost of implementation affect the competitiveness of small and medium-sized size tourism and hospitality businesses.

Rasheed et al (2023)	Pakistan	Explored reasons for the adoption of AI in hospitality in Pakistan from the customer perspective	Cultural values relate positively to the reasons and intentions of customers adopting AI. While attitude mediates between reasons and intentions to adopt AI services. Emotional intelligence does not moderate between their attitude and intention to adopt AI services.
Abd El Kafy et al (2022)	Egypt	Identified and assessed the implementation of AI services in the tourism and hospitality industry by service providers. Again, tourists' perceptions of the effects of AI services in tourism and hospitality	Benefits accrued to tourists from AI-assisted services included speed and accuracy in the performance of tasks. AI contributed to improvement in quality service and cost reduction. However, there was less social contact, difficulty in understanding, and loss of time when using AI applications. Also, there was a high cost of acquiring, operating, and maintaining AI programmes which were of concern to service providers

Generally, research in AI is on the increase across various sectors. However, the trend in tourism is seen as a late runner due to the service-oriented nature of the industry, demanding a human touch as compared to AI assistants. The outlook from the study indicated that various dimensions of AI are explored in research for various sectors. However, a lot of these research papers on AI usage or adoption in tourism were mostly conceptual; reviewing studies that have been written on AI in tourism. An implication is that though AI and robotics are seen adopted and used in tourism, it is also deemed as a future trend, though UNWTO (2017) sees AI as the future of tourism development.

Another observation from the reviews was the use of AI by developed countries in terms of robust AI assistants such as robots and chatbots in tourism establishments. Countries that showed the application of AIs were India, Vietnam, and China in the study, and among the few hotels that use the chatbots were Marriott Hotels, and Hyatt Hotels (Seal, 2019). Hence, though perceptions of the impacts of AI adoption are well known to people, the practical experiences from the adoption of AI technologies are less known. This observation confirms the concerns of Samala et al. (2020) and Murphy et al., (2017).

From the Ghanaian literature perspective, the use of social media, GIS, and digital tourism through imaginaries was seen. The literature portrayed less robust use of AI technologies in the tourism industry, which may not be surprising, because there is less practical adoption of the technologies in Ghana with its associated challenges of investment, infrastructure, and expertise among other barriers, and this is also common among emerging economies. Based on the criteria in selection which specifically insist on AI technologies, more of the tourism literature did not suit the study, showing the lacuna on AI and its related technologies studies despite various studies on tourism literature of Ghana.

CONCLUSION

Given the multifaceted nature and scope of the tourism and hospitality industry, some studies represent the scope. Likewise, conceptual studies and frameworks have been undertaken in AI and Robotics which cover areas such as; the impacts, barriers, and adoption across sections of the industry. However, most common studies are conceptual. This indicates a lack of empirical studies on AI adoption or implementation especially in emerging economies like Ghana. Therefore, research on AI and robotics in tourism and hospitality requires multifaceted empirical contexts in both developed and developing countries where AI is yet to be adopted.

Limitation: This study is conceptual and considered studies that specifically relate to AI, Imaginaries, and Robotics, especially in the Ghanaian context which is conspicuously lacking. Consequently, we recommend future empirical studies to test AI adoption, implementation, and challenges associated with AI applications in the tourism and hospitality industry in Ghana.

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