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DUAL PERSPECTIVES ON THE ROLE OF ARTIFICIALLY INTELLIGENT ROBOTIC VIRTUAL AGENTS IN THE TOURISM, TRAVEL AND HOSPITALITY INDUSTRIES

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Abstract

Robotics and artificial intelligence are challenging extant business services and fundamentally impacting business relationships and processes. While studies have elaborately investigated social robotic interactions in medical and health-related domains, studies are limited on artificially intelligent robotic virtual agents (AIRVA) and their impacts on consumer behavior in tourism and hospitality services. Building on the theories of user experience (UX), user interface (UI) and customer experience, this study conceptually examines the dual-value effects of AIRVA to the customer and the firm. It analyzes the customer journey and highlights critical touchpoints AIRVA deepens the customer experience. It also discusses specific contexts AIRVA impacts business process. It further evaluates challenges facing its adoption and makes critical recommendations to practitioners and academics on how to enhance its adoption in the tourism and hospitality industry.

Keywords: robots, artificial intelligence, customer experience, chatbots, recommender systems, privacy, touchpoints, tourism, travel, hospitality

Introduction

Unlike some decades ago, recent trends indicate that the tourism and hospitality industry is embracing robotics and artificial intelligence. For example, the Hen na Hotel in Japan is staffed and run by robots. Another example is "Taste and Aroma" restaurant in Guiyang, Guizhou Province, China. Furthermore, chatbots have been deployed by KLM, Hilton, Radisson Blu, Marriott Hotels, Edwardian Hotels, etc. According to a study by Travelzoo (2016), 68% of travelers welcome robots as room service staff, while 73% and 69% are happy to be served by robots as porters and waiters, respectively. The information-intensive nature of the tourism and hospitality industry and high level of customer contact within the industry underpin the great need for automation to deliver consistent quality service. The deployment of artificial intelligence has enormous potential for the tourism and hospitality industry, particularly considering it can give more insight and provide clearer understanding of customers' behaviors before, during, and after trips. Understanding these behaviors highlights consistent, personalized quality service. Despite recent growth in the adoption of robotics and artificial intelligence by tourism and hospitality firms, the academic literature remains very limited (Tung and Law, 2017). To this end, the role of artificial intelligence on both customer experience and business process remains unclear. Accordingly, from the perspectives of tourism and hospitality services, the objectives of this conceptual study are: 1) to examine the role of artificial intelligence on business process, 2) to examine the effect of artificial intelligence on customer experience, 3) to identify challenges facing its adoption and offer recommendations to practitioners and the academia.

Conceptualization of the Artificially Intelligent Robotic Virtual Agent (AIRVA) in Tourism and Hospitality Services

The domain of robotics research is vast and often confusing, especially to those outside the technical discipline. Accordingly, situating this article within a discussion that clarifies an understanding for both those in the technical and particularly in the business disciplines is critical for its successful adoption in a non-technical application domain. Generally, the term *robots* refer to autonomous machines that independently carry out a specific task (Decker, 2008). Similarly, robotic virtual agents are software agents "not physically present and are only digitally embodied with the graphics of a robot" (Tung and Law, 2017, p. 2500) and exists in the forms of text or

voice. On the other hand, *artificial intelligence* consists of algorithms embedded in computer programs that enhance the completion of tasks that otherwise require human intelligence, such as learning, perception, problem solving, language understanding, and logical reasoning (Frank *et al.*, 2017). With scientific breakthroughs in artificial intelligence, robotic virtual agents can perform tasks such as customer service and recommendation system. Examples of such include chatbots, recommender systems, and web and app platforms. Thus, in the context of this study, artificial intelligence-enabled platforms such as chatbots, recommender systems, and web and app systems shall be referred to as *artificially intelligent robotic virtual agents* (AIRVA).

User Experience and User Interface with AIRVA

Tourism, travel, and hospitality can be very emotionally charged, yet very rewarding. Consumers are getting demanding, and service providers are expected to meet these ever-increasing desires by improving the experiences of their customers. Thus, user experience (UX) is considered the creation and synchronization of the elements that affect how users engage with a particular company with the intent of influencing their perception and behavior (Unger and Chandler, 2012). Olaleye *et al.* (2017) summarized it as all aspects of the end user's interaction with the company, its services, and its products. Within the perspective of travel and tourism, there are many touch-points at which UX can be considered crucial, starting from booking the hotel room and room service to returning to the destination. Research regarding user interface (UI) often occurs in three key themes: websites for bookings, self-service technologies (SST) (Kim and Qu, 2014), and human-robot interaction (HRI). Sun *et al.* (2017) provided an updated comprehensive review of website evaluation studies in hospitality and tourism and found that most of the articles generally discussed UI, while Zalama *et al.* (2014) introduced Sacarino, the service robot that works in a hotel providing information for guests about the hotel's services and accompanying them through the hotel's spaces.

The UI interface is often discussed in conjunction with UX, as it encompasses the physical appearance of the device and the ease with which the user interacts with the device (Olaleye *et al.* 2017). Often, these interactions can be very complicated, and they are getting more intricate and detailed. For instance, bookings can be made on mobile phones, and check-ins are done using self-service technologies and automated services. In all these, the user engages with the technolo-

gy over an interface, which is the “part of the computer and its software that people can see, hear, touch, talk to or otherwise understand or direct” (Galitz, 2007, p. 4). This further reiterates the importance of a well-designed UI to improve the experience of consumers as they engage with these technologies. Adding all together, UX and UI are packaged to deliver a holistic and satisfactory customer experience (CX). CX theorists posit that it constitutes a multifaceted construct encompassing the cognitive, emotional, behavioral, sensorial, and social components of the consumption episode (Verhoef *et al.*, 2009). Thus, Lemon and Verhoef (2016) contend that satisfaction, consistent service quality, customer focus, and customer engagement are the critical antecedents of CX. Within the context of AIRVA in tourism and hospitality services, its conception, design, and delivery should target the total CX. First, customer interaction with the interface should be simplified, and all necessary information for ease of use communicated to the customer. For instance, though Facebook uses natural language processing (NLP) to promote chatbots, experts have faulted the use of NLP and recommend a simplified natural language understanding (NLU) that can deliver a more scintillating CX through a voice interface (LeCun *et al.*, 2015). Second, advanced features that enable language recognition and processing can perform more complex tasks. With personalized information, the interface can dynamically handle all tasks based on the context of the user. Third, the interface for AIRVA for recommendations should be able to provide travel advice, tour guide information, and concierge services that integrate the personality of the customer. Thus, automatized and personalized information should always be available at critical points of need without the necessity of pushing a button or pressing a key on the device.

The Role of AIRVA on business process

Artificially intelligent robotic virtual agents have significant roles to play in the business process management. As shown in the conceptual framework in Figure 2, through cognitive intelligence, four key impacts of AIRVA on business processes are identified which highlight the wide scope of intelligent assistance it offers.

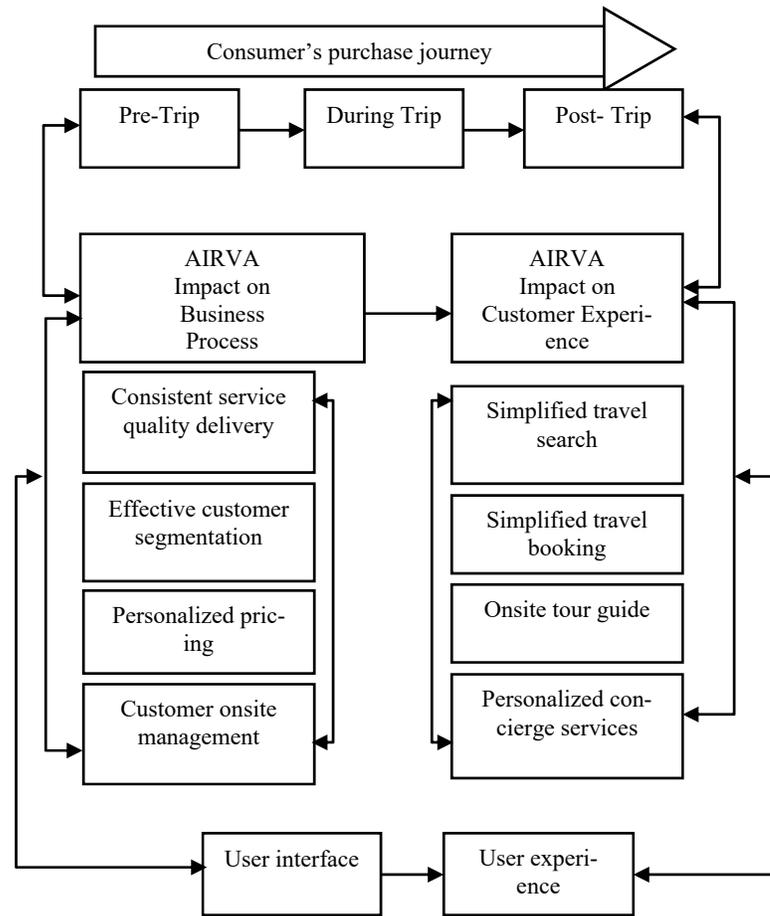


Figure 2. Conceptual Framework of AIRVA in Tourism and Hospitality Services

Consistent Service Quality delivery

Service quality is a critical customer evaluation metric for patronage (Shafei and Tabaa, 2016). With AIRVA, firms can anticipate a failure before it happens. AIRVA offers the possibilities of standardising service engagement and delivery, ensuring that quality service is delivered at every touchpoint and contributing a major source of innovation (Huang and Rust, 2018) which could be in form of an assistive robots with functional assistance to humans, through physical interaction (Feil-Seifer and Mataric, 2005). With the help of available data through chatbot interaction and other touchpoints, the firm can predict imminent service failures and take all the necessary steps to correct them. In addition, there are the possibilities of promptly dealing with customers' re-

quest, even if serving customers across the globe. Chatbot recognises pattern of request and learn from these interactions to always improve the customer experience.

Effective Customer Segmentation

With the machine learning capabilities of AIRVA, it has the ability of understanding patterns of request and can segment customers and provide a personalized answer to their request. The analytical, intuitive, and empathetic features are acknowledged (Huang and Rust, 2018) which highlights the possibility of understanding customer group with special needs or request for their journey, either through keywords identified during engagement and their frequent decisions and preferences (Maruti Techlabs, 2018). AIRVA can augment the situation to avoid any disruption in service provision. This ensures ‘cost-effective service excellence’ to different customer groups (Wirtz & Zeithaml, 2018) whose specific needs have been met.

Personalised pricing

Building on the effective segmentation, a unique and personalised pricing can be offered to individual customers taking into consideration previous engagement and personal situation. Cost comparison can crawl the website and gather information about prices of services from competitors and thereafter offering a customer a dynamic pricing that reflects loyalty to the company. Furthermore, through artificially intelligent-recommender systems, personalised deals and offer can be provided, thereby maximising the revenues from each customer (Pounder, 2015).

Customer Onsite Management

AIRVA is conceptualised to build on various engagements and interactions with the customers with the aim of optimising and managing customers’ requests. With the potentials of performing even the intuitive and empathetic tasks (Huang and Rust, 2018) coupled with a better understanding of interaction, AI enabled-chatbots can initiate a conversation based on previous engagement and learnt pattern. Furthermore, onsite customer management affords the firm the opportunity to provide innovative services and ensures that the customer derives optimal satisfaction while on the trip. Thus, a customer’s inquiries, questions, and concerns will be addressed with speed. However, in becoming an integral part of the onsite management system, firms must

acknowledge the learning process of the AIRVA and consumers attitude especially with regards to acceptance and trust (Čaić *et al.*, 2018).

The Purchase Journey and customer experience

A broad stream of marketing literature conceptualizes the consumer decision process as a purchase journey (Lemon and Verhoef, 2016). Traditionally, the five-stage model has dominated the marketing literature for decades (Peters and Mennecke, 2011). These stages include problem recognition, the information search, evaluation of alternatives, the purchase decision, and post-purchase decision. At the problem recognition stage, the consumer recognizes a need triggered by internal or external stimuli. The consumer proceeds to the next stage by searching for available information on how to satisfy the need. Information sources comprise the personal (e.g., family, friends), commercial (e.g., firm's commercial message), public (e.g., mass media), and experiential (e.g., personal contact with the product or service). However, some scholars have contended that this process is relative (Darley *et al.*, 2010), with individual characteristics, social influence, situation and economic factors, and online environment critically determining each consumption episode. To stimulate the five-stage process model, scholars have proposed the attention, interest, desire, and action model (AIDA model) (Hassan *et al.*, 2015). The model postulates that marketing messages attract attention and thus stimulates interest in the product. The consumers who see that the product or service fulfills and satisfies their needs move a step further to desire the product. The process culminates in action with a product purchase.

However, within the tourism and hospitality body of knowledge, the consumer journey has been conceptualized to comprise the pre-trip, during-trip, and post-trip stages (Fotis *et al.*, 2012), with each constituting a significant step toward fulfilling the overall travel plan. Specifically, the pre-trip stage constitutes all activities the consumer engages in before the journey. Generally, tourism is a high-involvement product, that is, it requires extensive thought due to its hedonic nature because the consumer wants to make the best out of the decision. To this end, the consumer engages in an extensive information search. Available sources of information include family and friends, mass media, social media, and firms' commercial messages. Such information helps the consumer to understand the price of the travel product and specific activities on offer. Additionally, the consumer might also find out general destination-related information such as weather, security, competitive offerings, visa requirements, time zone (in case of a distant journey), mode of transportation, and the intra-destination transportation system. Having obtained the necessary

information, the next stage is the experience during the trip. Within this stage, the consumer desires the best travel experience. This is the critical experiential stage that emotionally connects the consumer with the destination. Accordingly, scholars have conceptualized how specific tourism experiences emphasize activities the consumer engages in within such destinations and the necessary items of belonging required (Tung and Law, 2017). Thus, backpacking, rural, adventure, culture, nature, hiking tourism, and so on require specific items for the best experience. In some cases, the tourist is provided with a tour guide who gives historical explanations of the key areas within the destination. Commonly, tourists take pictures of such experiences as a reminder and reflection of the activities that took place within the destination. Finally, post-trip activities constitute a reflection about the events that took place while on the trip. Most consumers savor the trip experience by going through the photos and video clips they took while on the trip. As a way of expressing their emotion and informing their friends and family of the trip, some of the contents are posted and shared on social media platforms. Using these platforms, they also share textual reviews of the most pleasant memories of the trip and specific experiences they did not enjoy. Interestingly, in specific points within the customer journey, AIRVA deepens the tourist's experience through the following ways:

Simplified Travel Search

Travel search is very peculiar in hospitality and tourism sector because it is the foundation of traveler's itinerary plan and any failure at this stage can make the proposed journey unsuccessful. Searching for a hotel could be cumbersome due to elongated travel dates, multiple destinations and multiple booking sites (Gavalas *et al.*, 2014; Nicoli and Papadopoulou, 2017)). The complexities of existing travelling search engine demand a stress-free and easy to use travel search that can lead the travelers in a systematic manner for a successful booking. Time is precious and most travelers do not have enough time to merry-go-round the search site without a result. Simplified travel search is now possible through artificial intelligence algorithms that converge options based on the travelers' location and past travelling behavior. To enrich the traveler's experience, there is a need for more search content and filtering tools. This will enable the travelers to filter their options and take a quick decision regarding the hotel rating, price and destination results. Simplified travel search utilizes a smart and simple search interface with advanced machine learning metasearch that pulls information from the different sources regarding the hotel, airline,

world popular attractions locations and alert for the good, the bad, and ugly situations of the desired destination. The most interesting and remarkable aspect of simplified travel search is conversational search. With a voice chatbots, it is possible to search for information in respect of a vacation package, business visits or tourist journey. In real time a traveler can engage a Chatbot in a search conversation without distraction or fatigue of typing and brain racking.

Simplified Travel Booking

Travel booking could become a herculean task, especially when it is a single or group booking with some multiple places of visit. The intervention of artificial intelligence to solve these problems and simplify the travel booking is exceptional. Artificial intelligence has the potential to make life easy for travelers in travel booking and make the navigation simple and convenient. Attention is being shifted gradually from traditional search engine to bot engine in hospitality and tourism industry. Artificial intelligence has positively impacted the online booking process remarkably in the reservation system, transforming channel management, metasearch and incorporate analytics which is very useful for the business owner and the traveler. Artificial intelligence makes traveler personalization easier. This innovative leap is an added value to travelers' experience and it is the future of travelers' tension-free booking. Most of the airlines have introduced conversational chatbots for travel booking. A traveler can pose a booking question to the chatbot by giving a specification of the date, time, location (to and fro), price, class, preference and special services without rigorous typing and navigation (Ahmed and Singh, 2015).

Onsite Tour Guide

The tour guide is a tourism specialist that is commissioned to lead and direct tourist to a place of interest to allay fear and build trust for a successful tourism (Wang *et al.*, 2014). The tour guide is important personnel in a tourist journey and they function in a different capacity. A tour guide could be onsite guide, city guide, linguist guide, freelance guide and a driver. The scope of an onsite guide is limited to a building or a specific area and the tour narration and low-intensity interpretation (Hu and Wall, 2014; Healy *et al.*, 2016) could be on foot or by vehicle(s). The onsite tour guide can also employ artificial intelligence to make the experience of tourist memorable. Thus, AI enabled-chatbots and recommender systems can perform the function of guiding, providing explanation on important places and directing the tourist to important attractions within

the destination. Similarly through predictive analytics, intelligent recommendations, data gathering and sentiment analysis AIRVA can provide historical explanations that tie the tourists to the mood and ambience of the destination.

Personalized Pricing

Selling price is a crucial aspect of hospitality and tourism sector and the type of pricing strategy adopted could enhance travelers experience and motivate their loyalty (Richards *et al.*, 2016). Personalized pricing or dynamic pricing is time-sensitive and lifestyle conscious (Yaghmaee *et al.*, 2016). It could be low in the morning and high at noon or vice versa and its relevance is increasing in hospitality and tourism industry (Anderson *et al.*, 2015). Artificial intelligence can boost the impulse of personalized pricing through price comparison between lower and higher price (rate match). This will prevent the travelers from losing rate parity as the dynamic rate match algorithm reveal the best rate to the travelers. Real-time price intelligence will do the magic for the travelers and impact the travelers booking experience positively and excellently.

Challenges Facing the Diffusion of AIRVA

In spite of the above benefits to the firm and the customer, the adoption of AIRVA remains low. Though there may be several challenges facing the diffusion of AIRVA in the tourism, travel and hospitality industries, cost of adoption and attendant privacy and security concerns of customers' data are most critical.

Job security and cost

We have considered the upsides of robotics diffusion; it is also necessary to discuss the downsides of AIRVA in tourism and hospitality services. The emergence of service robots such as chatbots, robot porters, robot bartenders, robot concierges, delivery robots, conveyor restaurants, self-service information check-ins, and check-out kiosks are growing with solutions. Nevertheless, hospitality industry employees fear that the introduction of AIRVA will cost them their jobs (Ivanov and Webster, 2017). Due to the disruption of service robots in the hospitality industry, the cost of building an effective robot may pose an initial challenge despite its potential return on investment in the future. Different costs are associated with robot procurement such as acquisition costs, installation costs, software update costs, robot mobility costs, specialist hiring costs,

and staff training costs. The cost of a robot depends on the manufacturer and configuration. While comparing humans and robots, it is obvious that the cost of the robot is higher at the initial stage and the cost of engaging hospitality and tourism employees at a later stage will be higher because of the incremental expenses of promotions and incentives. Presently, it is easy for the large hospitality industry to adopt robotics and AI with ease, but the small and the medium hospitality industry adoption rate may be slow due to the financial commitment.

Security and Privacy Concerns

Privacy and security of customers' data constitute ethical issues about which scholars and practitioners cannot reach a consensus. Experts have warned that artificial intelligence constitutes a serious threat and huge risks to consumers' private information (Tene and Polonetsky, 2012). The premise is that artificial intelligence's ability to make good assumptions and recommendations is underpinned by the large amount of data it gathers. These data are often collected without the consent of the consumer. Thus, quoting Elon Musk, "AI is a fundamental risk to the existence of human civilisation" (Fast and Horvitz, 2017). That is, Musk contends that the only way to avert the imminent existential threat to humanity is for governments and regulatory bodies to proactively come up with strong policies to regulate the proliferation and use of artificial intelligence.

Conclusion, Implications and future research opportunities

Previously, consumers may have had to wait for several minutes to speak to their service provider, or send an email that may not be replied for several days. One of the greatest strengths of a chatbot is that it can answer a customer's questions immediately. They also never become tired or require a break (Alleycat, 2017); are faster at giving real-time responses to customers, and eliminate any hesitancy that might occur in or during the purchase (Methew, 2016). Through chatbots, consumers are able to receive the help they need in their purchasing cycles, and this often leads to an enhanced positive consumer experience. Chatbots have also led to a decrease in service failure as staff can spend their time solving complex queries while the chatbots deal with the repetitive and low level enquiries. As a matter of fact, this leaves several implications for practitioners and academics.

Managerially, despite the recorded success of robots so far, hospitality industry stakeholders are still anticipating an intelligent automated future that will pave the way for a collaborative robot, a scenario where different robots can work together to render intelligent service. For instance, the

integration of artificially intelligent chatbots, recommender systems and virtual reality will deliver a more memorable customer experience than each of them working in isolation. Additionally, designers should work on cooperative robot technology (robot-to-robot communication) and create an opportunity for open innovation between the academic community and the robotics industry. This cooperation will foster quick solutions to existing problems in the robotics industry. Furthermore, designers should come up with low-cost robots targeting the small and medium hospitality and tourism industry. The key stakeholders in the robotics industry should encourage developing countries through robotics licensing and technology transfer, as this process will be a panacea for the lack of technical expertise in developing countries. There should be more publicity about robotics innovation among academia and industrial settings. Expertise from varied fields should be involved in robotics development since it is multidisciplinary in nature.

As a nascent domain, the rapid diffusion of artificially intelligent chatbots and other virtual agents has opened up interesting research opportunities from both the firm and consumer perspectives. From the firms' point of view, there have been arguments that artificially intelligent robots will rapidly takeover jobs done by humans with most employees having negative perceptions of robots (Smith and Anderson, 2014). Future research could explore the perceptions of employees, particularly customer service, on the deployment of AIRVA as regards their job security. Furthermore, not all virtual agents are enabled by artificial intelligence. While some are fully automated, others require human assistance to complete their tasks. Accordingly, future studies could investigate return on investment (ROI) on these platforms. For instance, how can firm's measure ROI where a consumer initiates a conversation with a chatbot but completes the transactions offline? On the side of the consumer, future studies could explore the role of gender, age and personality on the acceptance of AIRVA. Importantly, studies within the medical field suggests that inserting a pop-up chatbot on a medical website increases customers' satisfaction and deepens user experience (Fan, Fought and Gahn, 2017). Relating this to the tourism and hospitality domain, will consumers derive same level of satisfaction or more with AIRVA as they do with customer service? Some consumers find it irritating when chatbots pop-up on their devices (Boutin, 2017). Accordingly, how can businesses convince consumers that bots are not intrusive but designed to provide useful recommendations and assistance?

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