Factors affecting value co-creation through artificial intelligence in tourism: a general literature review

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Abstract

Purpose – *This is a general review study aiming to specify the key customer-based factors and technologies that influence the value co-creation (VCC) process through artificial intelligence (AI) and automation in the hospitality and tourism industry.*

Design/methodology/approach – *The study uses a theory-based general literature review approach to explore key customer-based factors and technologies influencing VCC in the tourism industry. By reviewing the relevant literature, the authors conclude a theoretical framework postulating the determinants of VCC in the AI-driven tourism industry.*

Findings – *This paper identifies customers' perceptions, attitudes, trust, social influence, hedonic motivations, anthropomorphism and prior experience as customer-based factors to VCC through the use of AI. Service robots, AI-enabled self-service kiosks, chatbots, metaversal tourism and new reality, machine learning (ML) and natural language processing (NLP) are technologies that influence VCC.*

Research limitations/implications – *The results of this research inform a theoretical framework articulating the human and AI elements for future research set to expand the models predicting VCC in the tourism industry.*

Originality/value – *Few studies have examined consumer-related factors that influence their participation in the VCC process through automation and AI.*

Keywords *Automation, Machine learning, Metaversal tourism, Mixed reality, Natural language processing, Virtual reality*

Paper type *Research paper*

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1. Introduction

Customer experience is vital in the hospitality and tourism industry (Buhalis and O'Connor, 2005; Volo, 2009). The experiential nature of tourism demands that value for customers be realised through a collaboration between hospitality firms and their customers because such collaborations can impact customers' evaluation and willingness to pay for the service (Prahalad and Ramaswamy, 2004a). The co-creation literature argues that value is created when the customer plays an active role in conceiving the composition and the delivery of an offering unique to the customer and sustainable to the firm (Prahalad and Ramaswamy, 2004b; Vargo and Lusch, 2004). This suggests the need for hospitality firms to strive for a collaborative relationship that actively considers customers' opinions, learns from the customers and implements their ideas.

Recently, technological advancements have become a driving force for facilitating the collaboration process for value creation (Buonincontri *et al.*, 2017; Lu *et al.*, 2019). The infusion of technology into service delivery has helped to avail better opportunities for firms to meaningfully engage and co-create unique experiences for their customers (Wirtz *et al.*, 2018). Lusch *et al.* (2007) contend that technological advancements in artificial intelligence (AI) and service automation can augment the process of collaboration such that the process can become more memorable for customers and, at

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the same time, increase the service-delivery competencies for firms. AI offers advanced data computing capabilities, ample storage and super-fast speed, enabling hospitality firms to integrate customer information and make more accurate predictions about consumer needs (Duan *et al.*, 2019). At the same time, automation empowers machines to execute predetermined and reprogrammable tasks during the collaboration process (Ivanov *et al.*, 2017), such as personalising and customising service offerings in response to relayed customer information. Indeed, such is the pervasive nature of AI that its reach expands beyond the tourism industry and can be used as a platform for heuristic searches, character recognition, facial recognition systems, the processing of natural language and the concept of mobile robotics (Samala *et al.*, 2020). AI is currently being used in "smart" entertainment systems in homes by NASA (National Aeronautics and Space Administration) in its space exploration ventures (Borana, 2016) and by educational facilities to enhance students' learning (Samala *et al.*, 2020).

In response to technological advancements, more hospitality firms are giving strategic priority to offering unique services with the power of technology (Walls *et al.*, 2011). Accordingly, AI and automation have attracted recent academic interest among hospitality and tourism scholars (Samala *et al.*, 2020; Ruel and Njoku, 2021; Haynes, 2020; Parvez, 2021; Fusté-Forné and Ivanov, 2021; Seyitoğlu and Ivanov, 2020; Yallop and Seraphin, 2020). Existing studies attempt to accentuate the need for firms to incorporate emerging technologies such as AI and automation for enhancing value co-creation (VCC) activities (Grönroos, 2008; Lusch *et al.*, 2007). Duan *et al.* (2019) reiterate the inherent benefits of using AI and automation to anticipate customer expectations and customise unique offerings for customers. However, little research has been done to understand the key consumer peculiarities that can influence their participation in the CC process. The present study is motivated by the seeming nascency and plausibility of AI and automation as effective mechanisms for VCC. Bolton *et al.* (2018) contend that the prospects of these technologies, as effective mechanisms for VCC, are still fraught with challenges of implementation and customer acceptance. In this light, this study seeks to examine the key customer-based factors and technologies that influence an AI and automation-enabled VCC process, focussing on the hospitality and tourism industry.

First, the paper examines the theoretical underpinnings and functionality of the VCC process. Then, we examine, in practical terms, how customer-based factors and specific technologies can influence the CC process. The study will have practical relevance in defining customers and target groups for effective CC, as well as in developing marketing strategies for engaging these customers with the use of AI and automation.

2. Methods

We followed Templier and Paré's (2015) multi-step procedure to accomplish this investigation's goals. As a first step, we framed the present study's research question — we want to understand more about the main customer-based elements and technologies that drive the VCC process via AI and automation. Second, we sifted through the existing literature on human psychological factors and AI-powered technologies in relation to VCC in tourism to find the sources that would help us build our theoretical framework. Third, we sought the advice of two independent expert peers, who could assist us in avoiding bias in our source selection process. Finally, we synthesised the elements mentioned in previous research that eventually shaped the findings of this investigation.

Below are the results of recent investigations about the predictors of VCC in the tourism industry in an AI-dominated setting are reviewed. First, studies on the theoretical underpinnings of VCC in tourism will be discussed, followed by studies on human psychological variables alongside those pertaining to AI expected to shape the effectiveness of VCC in tourism. This review is closed with a figure summarising the main results of the reviewed studies and a conclusion.

3. Value co-creation in tourism

The concept of VCC is entrenched in the service-dominant logic (SDL) (Vargo and Lusch, 2016), a logic based on the premise that service and engagement are fundamental to the realisation of value

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for both the firm and its customers. SDL emphasises collaboration, mutuality and reciprocity between producers and consumers at every stage of the value creation process (Vargo and Lusch, 2016). According to SDL, the customer is perceived as an active resource who must be involved in the value creation process and should be able to influence available organisational resources to create innovative products and services (Pongsakornrungsilp and Pongsakornrungsilp, 2021; Koskela-Huotari and Vargo, 2016; Vargo and Lusch, 2016). At its very essence, the SDL seeks to offer firms the opportunity to improve their product offerings through engagement with their customers. Despite the increasing trend towards firm–customer VCC in the tourism industry, there is a limited understanding of the effects of customer co-creations on the tourism industry (Sugathan and Ranjan, 2019). An emerging trend in tourism is the desire for customers to initiate the co-creation experience (Neuhofer *et al.*, 2012), which has been the essence of *smart tourism* (Ballina, 2020) — it represents "an individual tourist support system within the context of information services and an all-encompassing technology" (Li *et al.*, 2017, p. 293). Thus, smart tourism is evolving in such a context, with the term attempting to delineate the increasing reliance of tourism industries, tourists and destinations on emerging forms of information and communications technology (ICT) that allow the transformation of massive amounts of data into value propositions (Katsoni *et al.*, 2017).

Prahalad and Ramaswamy (2004a) posit that the process of VCC begins with a resource from a firm-centric to a customer-centric view, where organisations must reconfigure their core activities to involve customers in a purposeful dialogue. The CC process goes beyond a single interaction to involve a series of deliberate encounters to improve product innovativeness and enhance customer satisfaction. In line with Payne *et al.* (2008, p. 85), who perceive CC to be a process-based relationship involving "... a longitudinal, dynamic, interactive set of experiences and activities performed by the provider and the customer, within a context, using tools and practices that are partly overt and deliberate ...." Chathoth *et al.* (2013) note the relationship to move along a continuum of participation intensity, where a high level of dialogue at each encounter with customers is necessary to drive innovation. These findings suggest that creating a superior customer experience is an important strategy for most firms in the tourism industry (Sugathan and Ranjan, 2019).

Dialogue promotes information sharing and participation in the co-creation process. Prahalad and Ramaswamy (2004b) describe dialogue as entailing engagement, interactivity and the propensity to act by the firm and the consumer. By participating in dialogue, both parties can harmonise conflicting issues of interest to develop shared solutions that benefit both parties. The rules of engagement should be clearly defined while each party perceives the other as an equal partner (Solakis *et al.*, 2022). The authors, however, note that dialogue can only be effective when customers have equal access to information and perceive transparency in the information that is made available by the firm. The combination of dialogue, access and transparency enable customers to assess the risk and benefits of being active co-creators. According to Ballantyne (2004), the process of customer dialogue serves as a learning process, where the customer's experience is the focal point. As customers share their consumption experience, they provide firms with valuable information to re-strategise their processes and redesign their offerings (Kristensson *et al.*, 2008).

Neuhofer *et al.* (2012) suggest three reasons for the increasing trend in co-creation in the tourism industry. First, advances in technology enable tourism firms to facilitate consumers' participation. Second, customers' feeling of empowerment and desire to control their holiday experience. Finally, tourism firms realise the importance of co-creation to the firm and the consumer. Despite the reasons mentioned above, implementing the CC process may seem challenging due to the divergent goals between firms and customers. However, successful CC must incorporate the integration of resources, the anticipation of expectations and the harmonisation of interests for both the firm and its customers (Payne *et al.*, 2008). For firms, the aim is to engage in purposeful dialogue to learn from customers and design better offerings (Solakis *et al.*, 2021). This would require a review and understanding of the customer's value-creating process to facilitate customer

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engagement at specific value-creating opportunities (Chathoth *et al.*, 2013). In such a manner, the firm can design its processes to align with those of the consumers; and develop metrics for assessing appropriate value propositions (Payne *et al.*, 2008). For customers, the process can require different forms of inputs that include expertise, experience, time, cultural, physical and emotional inputs (Chathoth *et al.*, 2013). In their various forms, these customer inputs partly constitute the experiential components of the value-creation process and can help to ensure innovativeness in the final offering. Vargo and Lusch (2004) add that the experiential components are imperative for actual value to be realised during the design and consumption process.

Chathoth *et al.* (2013) suggest that customer involvement is a crucial factor that distinguishes CC from co-production. Although "encounters between a firm and its customers can be initiated by either or both parties, the onus is on the firm to recognise and promote such encounters by using specific mechanisms that can proffer value-creating opportunities". As Payne *et al.* (2008) add, the ability of customers to engage in the CC process is contingent on the knowledge, skills and operant resources that they can access and use. Finally, Sarmah *et al.* (2017) identify "the use of technology" as a core mechanism for firms to facilitate the VCC process.

3.1 AI-disrupted value co-creation process

Mahmoud *et al.* (2020, p. 177) define AI as "computational technology driven by ways in which people use their brains' neurons and nervous systems to reason and make conclusions and decisions, although they usually work very differently." In comparison, automation can be described as the use of machines and robots to conduct specific tasks in service delivery to customers (Ivanov *et al.*, 2017). Therefore, in applying technology to hospitality and tourism, the incorporation of AI and automation to service delivery is crucial (Ritzer, 2015).

The use of technology can provide tourism firms with a platform to engage customers with meaningful CC experiences that facilitate dialogue and organisational learning. Further, advancements in technology application offer specific advantages in terms of efficiency, speed, predictive accuracy and consistency in service delivery to customers (Ivanov *et al.*, 2017). Of note, in the application of technology to hospitality and tourism is the incorporation of AI and automation to service delivery (Ritzer, 2015). Whilst automation centres on machines executing a series of instructions exclusively set by humans, with AI, however, the machine can take expansive rules sketched by humans and specify its own pathways to success by learning what works and what does not, so its performance improves over time on its own (Shani, 2021). Additional benefits of AI include the ability to offer a wide range of information on key factors such as natural resources, general infrastructure facilities, tourist infrastructure facilities and destination tourism infrastructure facilities (Samala *et al.*, 2020).

In the context of VCC, AI and automation features are incorporated into service robots which enable robots to interact with customers in the likeness of regular employees. One example of such virtual (online) co-creation communities (OCC) includes Starbucks "mystarbucksidea.com", Lego's "idea.lego.com" and McDonald's "Make your own burger". Further, more hospitality brands are adopting AI-enabled chatbots to facilitate interactions and deliver customer services in an online environment. Such include "Chatbotlr" and "Rose" powered by Marriot Hotel and The Cosmopolitan Hotel of Las Vegas, respectively (Trilyo, 2018). In a face-to-face setting, AI-enabled interactions can occur during automated check-ins at the front desk, where robots can be designed to have the appearance of humans and to perform analytical, cognitive and emotional functions autonomously, as is present in Hotel Henn-na, Japan (Lu *et al.*, 2019).

AI provides some of its benefits to the VCC process in its aptitude to efficiently store and retrieve large amounts of customer data, integrate consumer information, predict consumer preferences, provide general and personalised information to guests, personalise guest experiences, accept voice commands and manage facial and speech recognition (Shubhendu and Vijay, 2013; Ruel and Njoku, 2021; Samala *et al.*, 2020; Parvez, 2021). Customer data can then be used to create idiosyncratic and consistent customer experiences through automation. For example, information

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about customers' preferences on a previous visit can help promote meaningful customer interactions and create a more memorable experience for the customer's next visit.

Bowen and Morosan (2018) highlight some imperatives required for an AI and automated system to create customer value. First, it must be designed with an attractive user interface that can elicit impressions and emotions. Such interfaces can be administered through digital devices in the form of computers, smartphones, tablets and other similar devices. Second, it must be sufficiently customisable to appeal to the different user segments. Third, its use should be similar in functionality to other contemporary platforms. These imperatives enable AI and automated systems to integrate seamlessly with the service environment and create meaningful customer encounters that improve organisational learning and, ultimately, the CC experience.

Consumer advocacy towards adopting new technologies mostly originates from inherent service efficiency, self-efficacy, convenience and satisfaction rendered by such technology (Cobos *et al.*, 2016; Marinova *et al.*, 2016). Inexorably, AI and automation seek to offer benefits to the CC process, which can trigger customer empathy towards the use of AI and automation. However, the hospitality and tourism industry has long thrived on interpersonal interactions between employees and customers. Therefore, introducing AI and automated robots as substitutes or complements for actual employees may contrast with the traditional view of hospitality services; and further pose an emotional and psychological challenge for customers (Lu *et al.*, 2019). More so, the human-like features of AI-enabled may trigger contrasting perceptions from customers. For example, some customers may interpret these human-like features as welcoming, warm and friendly (Van Doorn *et al.*, 2016), while others may perceive this as a threat to their human identity, security and privacy. These mixed views can distort the predictability of consumers' likelihood to embrace AI and automation in the VCC process.

In light of these findings, this paper examines prior literature to identify key customer-based factors that influence VCC powered by AI and automation in the hospitality and tourism industry.

4. Customer-based factors influencing the VCC

4.1 Customer perception

Our investigations into prior literature reveal that customers' perceptions about AI and automation generally play a significant role in their decision and ability to participate in the VCC process. Though a broad term, customer perception is the distinct peculiarities that characterise its significance to customers. To better understand customer perceptions, the technology acceptance model (TAM) (Davis *et al.*, 1989) proposes customer perception in terms of 'perceived usefulness' (PU) and perceived ease of use (PEOU) as significant predictors of consumers' attitude and behavioural intentions to adopt technologies.

Scholars, however, contend the veracity of the two dimensions and the general practicality of the TAM in predicting customer intentions to use AI during service encounters (Gursoy *et al.*, 2019). They argue that TAM was originally developed to investigate the adoption of technologies that do possess human-like intelligence. AI, on the other hand, empowers machines to act like humans. Therefore, such devices may not require users to learn how to use them, thus rendering the constructs of PEOU irrelevant. Similarly, Gursoy *et al.* (2019) argue that since AI-enabled devices are designed to interact with customers like front-desk employees, implying that the construct for PU is also less likely to be relevant. We consider these arguments insufficient to dispute the effects of both constructs. AI may be designed to imitate human behaviour, but it requires a digital platform and an interface to be administered through. Such a platform will be integrated with a database to retrieve customer information and create idiosyncratic experiences for customers (Bowen and Morosan, 2018). We argue that the PU and PEOU constructs of the TAM can be brought to bear when customers must learn how to use and interact with using AI and automation on such platforms. Hence, we include the constructs of PU and PEOU as customer-based factors influencing VCC through AI and automation.

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4.1.1 Perceived usefulness. In the TAM, Davis *et al.* (1989, p. 985) define PU ". . .as the prospective user's subjective probability that using a specific application system will increase his or her job performance . . .". PU pertains to the peculiar advantages and benefits that a system can offer in its use. In the context of the VCC in hospitality and tourism, a core function of customers is to share relevant information and promote dialogue to improve innovativeness in the service offering. PU can thus be interpreted as the extent to which customers consider AI and automated services to render certain advantages when sharing the relevant information and participating in the VCC process.

The use of AI and automation in VCC can facilitate dialogue through its large database of integrated customer information and advanced computing capabilities to anticipate customer expectations and generate personalised encounters between the firm and its customers. In addition to utility, these features can generate specific time and effort saving advantages. Hence, we suggest that the customer's PU and VCC process automation will influence their predisposition to participate in the process.

4.1.2 Perceived ease of use (PEOU). The PEOU is defined as the ". . . degree to which the prospective user expects the target system to be free of effort . . ." (Davis *et al.*, 1989, p. 985). The effort represents the resources that a person must allocate to actualise activities for which he/she is accountable. Bowen and Morosan (2018) argue that for AI and automation to create value, they must be designed with an attractive interface that is sufficiently customisable and contemporary in use. This argument portrays the notion that customers require some knowledge about using digital interfaces and gadgets through which AI and automated CC are administered. Hence, we propose that customers' perception of the effort required to use platforms empowered by AI and automation will have a significant influence on the VCC process.

4.1.3 Perceived trust. Customer perceived trust has been identified in the literature as an antecedent of customer intention and attitude to adopt technology (Flavián *et al.*, 2006; Lin and Wang, 2006; Singh and Srivastava, 2019). A core component of AI is its spacious database to store large amounts of consumer data (Chathoth *et al.*, 2013). An array of consumer data is integrated into this database so that the data can be used to anticipate customer expectations and create idiosyncratic experience and customer experiences. Hence, customers will be expected to release some of their personal and sensitive information to engage in the VCC process effectively. The concern for perceived trust lies herein, as customers will only have limited control over the use of personal information. Ba and Paul (2002) posit that uncertainties are inevitable in most socio-economic interactions, and trust is required to stabilise such interactions, especially in an uncertain environment (online). In addition, Bonsón Ponte *et al.* (2015) identify perceived security and perceived privacy as significant factors influencing customer trust. Consequently, we consider the perceived trust, reflected in concerns for privacy and security to be significant predictors of customer participation in the VCC process.

4.2 Customer attitude

In the extant literature, the customer attitude has attracted various definitions from scholars. Nevertheless, there is a general concurrence of the term to imply the positive or negative predisposition derived after an individual's assessment of a subject (Adams *et al.*, 1992; Ajzen and Fishbein, 2005; Wittenbrink and Schwarz, 2007). Curran and Meuter (2005) highlight that technology evaluation can vary in context, and individuals can exhibit different attitudes towards automated technologies. In other studies that utilise the TAM as a framework, attitude is also identified as an antecedent of technology adoption intentions (Dabholkar, 1996).

Ivanov *et al.* (2018) identified attitude as a significant factor influencing customer acceptance and found two distinct groups of customers concerning their attitudes towards the acceptance of robots and AI in hospitality. The "high-techies" are those who have a high positive attitude and are receptive to new technologies. And the "high-touchies" are sceptical of service robots and prefer

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human interactions. Following the customer attitude literature, this paper reiterates that attitudes towards value creation through AI and automation can be affected by the outcome of an individual's evaluation or perception of the process and by the specific characteristics of the individual.

Gursoy *et al.* (2019) propose a theoretical model of AI device use acceptance (AIDUA) to investigate consumer willingness to accept the use of AI in service delivery. Their study identifies social influence, hedonic motivation and anthropomorphism as constituents of the first stage of primary acceptance. According to the authors, individuals initially evaluate the relevance and congruence of the use of AI devices to their personal identities. If this initial evaluation is relevant and congruent to the three constituents of the primary stage, then a second stage evaluation will follow to appraise the cost and benefits of adopting AI in service delivery.

4.3 Social influence

Social influence is the degree to which a customer's social group believes that a subject of interest is relevant and congruent to group norms (Gursoy *et al.*, 2019). Prior research suggests that social influence in subjective norms plays a significant role in the early stages of innovation adoption (Taylor and Todd, 1995) and user intention (López-Nicolás *et al.*, 2008). Subjective norms reflect an individual's perception that performing behaviour will be approved by its social group(s) (Fishbein and Ajzen, 1975). In this study, social influence can be seen as the extent to which a customer's social group believes that they should engage in VCC through AI and automation. Venkatesh and Morris (2000) suggest that social influence can affect perception towards technology adoption through the process of internalisation. Therefore, customers internalise their reference group's subjective beliefs and culture into their personal beliefs.

According to the social impact theory (Latané, 1981), people tend to adopt and conform to group norms if that group is important to them, more so, when such conformation boosts the customers' social identity and intensifies the relationship of the individual to the group. Thus, this paper posits that if a customer's group(s) of social reference holds a favourable opinion towards VCC through AI and automation, such a customer will, in turn, develop favourable opinions towards the process.

4.4 Hedonic motivations

In the motivation literature, hedonic motivations are described as the perceived pleasure and fun derived from the utility of an object (Law *et al.*, 2018; Venkatesh *et al.*, 2012). In addition, hedonic motivations have been found to be significant antecedents of tourist behaviour (Migacz and Petrick, 2018; Pestek and Sarvan, 2021), as well as a tendency to adopt technology (Venkatesh *et al.*, 2012; Allam *et al.*, 2019). In this study, we consider hedonic motivations to be the feelings of fun and pleasure derived from engaging in VCC activities through AI and automation. Thus, we posit that when a customer derives intrinsic feelings of pleasure and fun from using AI and automation in the VCC process, they are likely to participate more in the process.

4.5 Anthropomorphism

Kim and Mcgill (2011) discern anthropomorphism as the level of human-like characteristics present in an object. Such characteristics include having human physical attributes and exhibiting human intellectual competencies such as emotions and self-consciousness. We agree that anthropomorphism is a customer-based factor since it is derived from customer perceptions. In this study, we interpret anthropomorphism as the degree to which customers perceive AI and automated-enabled devices to possess and exhibit human characteristics. The literature on AI and automated service delivery contends contrasting views on the subject. While some scholars argue that human-like attributes can reduce discomfort and increase familiarity with customers, thus triggering purchase intentions (Kim and Mcgill, 2011; Aggarwal and Mcgill, 2007), other scholars claim that human-like attributes in robots can be perceived as threats to human identity and

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existence (Rosenthal-von der Pütten and Krämer, 2014). In light of these findings, this paper considers anthropomorphism as a perception-based factor that can influence participation in a VCC process facilitated through AI and automation.

4.6 Experience

Previous studies have identified customer experience as a key factor in influencing the use of new technology (Venkatesh *et al.*, 2003; Kim and Malhotra, 2005). Customers' prior experience can produce the knowledge and expertise to use a product effectively and efficiently. Moreover, Ajzen and Fishbein (2005) propose knowledge to be a strong predictor of future behaviour. Hence, we suggest that a customer's prior experience with the use of AI and automation can bestow customers with the necessary skill-sets, knowledge and aptitude to engage in the VCC process.

5. Technologies influencing the VCC process

For AI and automated systems to create value, these technologies must seamlessly facilitate integration and customisation in the service environment (Bowen and Morosan, 2018). Hence, this paper focuses on technologies that promote interaction with customers and the personalisation of service offerings. The literature identifies five key technologies as particularly influencing the value creation process in hospitality and tourism.

5.1 Service robots

Service robots are designed to support and service humans through physical and social interactions (Ivanov *et al.*, 2017). Service robots can be empowered with AI and automation features in the hospitality industry to perform traditionally human roles in customer services, such as front desk officers and concierges. In assuming these roles, robots interact with customers and store customer information (Fusté-Forné and Ivanov, 2021). A typical example is an AI-empowered robot called "Connie", employed by Hilton Hotels. Connie can interact with guests and provide tourist-relevant information. At the Henn-na Hotel, Japan, service robots are used at the front desk and as in-room companions. In the case of room companions, services robots are programmed to respond to voice commands and adapt to specific individuals.

5.2 AI-enabled self-service kiosks

In hospitality, self-service kiosks have been widely adopted to automate guests' check-in and check-out processes (Carlisle *et al.*, 2021). Customers can easily check in by inserting their personal data or scanning an identification document. AI can also power self-service kiosks to provide personalisation services such as room preferences (e.g. lighting, preferred temperature) or other audio-visual components at a guest's check-in. More importantly, AI-empowered self-service kiosks can empower the storage and integration of guest preferences to replicate a similar service on their next visit (Pryor, 2013).

5.3 Machine learning (ML) and natural language processing (NLP)

Machine learning (ML) and natural language processing (NLP) are analytical tools of AI that are essential for the process of using AI to create customer value (Aluri *et al.*, 2018). Mahmoud *et al.* (2020, p. 177) define ML as the "branch of science that enables the machines, i.e. the computers, to learn without being overtly programmed." ML is a powerful tool for predictive analytics with a variety of application techniques building on massive quantities of data (Calvaresi *et al.*, 2021) and utilising predetermined models and algorithms (Aluri *et al.*, 2018). ML can empower the VCC process by identifying patterns in consumer behaviour to segment and create specific profiles for targeting. On the other hand, NLP explores the use of computers to understand and manipulate text, language and speech (Ballina, 2020). NLP is an essential tool for robots when decoding and

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interpreting commands while interacting with customers, whether in text or voice. Thus, NLPs are not restricted to detecting what the user is saying but also attempting to grasp tone, mood, etc. — generating ML-based predictions (Calvaresi *et al.*, 2021).

5.4 Chatbots

Chatbots are AI-empowered apps utilised to facilitate real-time interactions with hotel guests through text messaging (Ukpabi *et al.*, 2019). They are designed to help customers with information to plan their intended experience (Calvaresi *et al.*, 2021). During the experience, chatbots can be used as mobile concierges to provide relevant information to guests (Parvez, 2021). Chatbots use NLP to understand customer requests and provide guests with relevant information (Parmar *et al.*, 2019).

5.5 Metaversal tourism enabled by new realities — virtual (VR), augmented (AR) and mixed (MR)

Virtual reality (VR) is a computer technology that utilises images, sounds and sensations to simulate a user's physical presence in the virtual world, where users may navigate and interact (Guttentag, 2010; Ballina, 2020). Recently, global hotels like Marriot, Best Western, Hyatt and Hilton have begun to incorporate virtual reality into the customer experience. VR can help provide some information needed to customers before booking a room. Customers can experience virtual room tours in a 360-degree view (Monaco, 2018).

Augmented reality (AR) is a "computer-generated object that improves the real-world environment, offering context-sensitive information about the user's close surroundings in the combination of image, 3D models and immersive features using the technological appliance, that is, eyeglasses, a desktop, tablet and a smartphone" (Alam *et al.*, 2022, p. 1, Yung and Khoo-Lattimore, 2019). A growing number of hotels are recognising the value of AR and its role in making the hotel experience a more delightful place to spend time (Carlisle *et al.*, 2021; Yung and Khoo-Lattimore, 2019). Holiday Inn, for instance, developed an AR hotel experience that enables customers to point their smartphones towards the hotel and view realistic virtual representations of celebrities on the premises of the hotel (Martins, 2017).

Mixed reality (MR) is a term that refers to a very natural augmentation of the real environment for users (Buhalis and Karatay, 2022). MR devices effortlessly combine and mix 3D material that seems to be realistic with the user's real world. It is so lifelike that users cannot distinguish between virtual and actual items, creating a seamless experience between real and digital settings (Buhalis and Karatay, 2022, Rauschnabel, 2021). MR needs specialised hardware like smart glasses with transparent displays in place of lenses and various sensors to monitor the user's environment (Buhalis and Karatay, 2022). Digital technology such as laser scanning (Bec *et al.*, 2021; Versaci and Cardaci, 2014; Little *et al.*, 2018) enables the creation and recreation of settings or items in two- and three-dimensional forms to provide both digital and physical interactions. Photogrammetry and computer modelling are used to reconstruct locations that are no longer physically accessible along with the possibility of developing a recreated "place," tourists and locals may participate by uploading personal and historical photographs (Bec *et al.*, 2021). For instance, Project Mosul is recreating vanished artefacts using tourist photography and video, as well as archive records and images (Vincent, 2017; The Economist, 2016). As a network of 3D virtual realms concentrated on social connection, the metaverse, in the context of tourism, combines physical reality with MR (AR and VR) to merge all needs and stakeholders in a shared, three-dimensional virtual realm and converts actual areas to MR spaces, reshaping the Internet into a parallel virtual universe (Buhalis and Karatay, 2022). This ultimately leads us to what we would call metaversal tourism — the eminent future of tourism.

6. Summary of the results

Figure 1 depicts a conceptual framework of the antecedents of VCC effectiveness in an era of AI and its related technologies. It represents a synthesis of the extant literature, the identification of the relevant variables and their relationships to each other in an effort to guide future empirical

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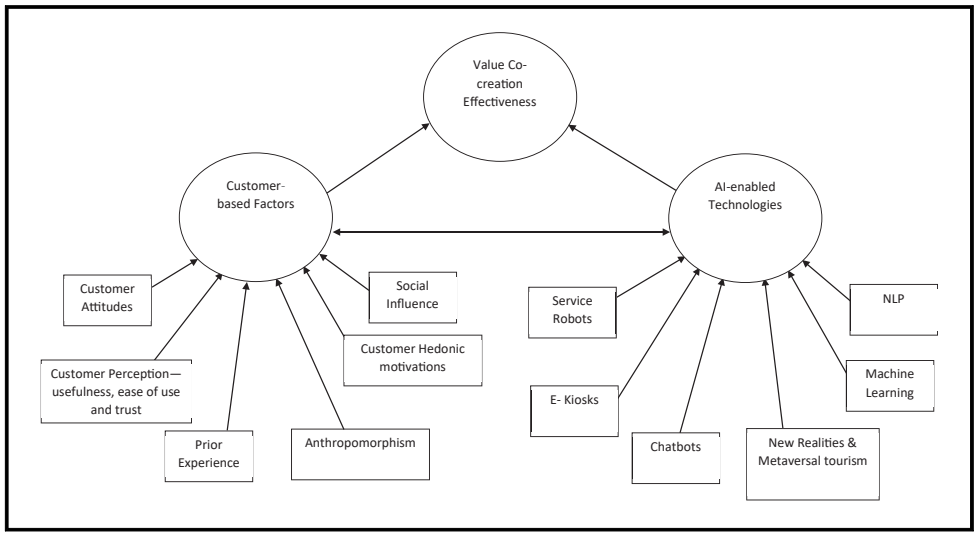
Figure 1 Framework for predecessors of value co-creation effectiveness considering AI-enabled technologies



validation of the framework. It also allows scholars to employ a quantitative research design that examines the complexities and the potential interactions of the relationships among the proposed variables. Thus, the conceptual framework can be viewed as providing a theoretical overview of intended future research.

The conceptual framework depicted in Figure 1 represents our best attempt to unify the relevant theories (and their variables) and to direct future empirical research designs with a view of bridging the gap between our theoretical observations and empirically validated conclusions.

7. Conclusion

This paper has concentrated on reviewing the tourism literature of co-creation experiences, identifying theoretical ideas and summarising definitions and themes to understand how technologies are used to improve co-creation between consumers and tourism firms. The paper explores the context of co-creating customer value using AI and automation in the hospitality and tourism industry. We identify key customer-based factors and specific technologies that influence this process regarding customer-based factors, customer perceptions, attitude, trust, social influence, hedonic motivations, anthropomorphism and prior experience as significant factors that can influence the process of value creation through AI and automation. These customer-based factors can be specific to an individual and can motivate or deter a customer's inclination to partake in the CC process. The implication for hospitality firms is to understand the effect of these factors on the CC process and align the process to accommodate possible customer segments identified by these factors. Further, the increased use of AI in the tourism industry provides an opportunity for tourism firms to improve their level of customer satisfaction while streamlining business protocols and processes (Samala *et al.*, 2020).

Finally, technologies such as service robots, AI-enabled self-service kiosks, chatbots, Metaversal tourism technologies, ML and NLP have been highlighted to influence the VCC process. Generally, these technologies have only assumed prominence in use within the past decades and still hold considerable potential in their application to tourism and the value creation process. Given the current trajectory in the advancements of these technologies, we posit that future advancements will complement the use of AI and automation in the VCC process.

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