Understanding travellers' reactions to robotic services: a multiple case study approach of robotic hotels

Article *in* Journal of Hospitality and Tourism Technology · December 2020

DOI: 10.1108/JHTT-01-2020-0015

CITATIONS
0

READS
390

2 authors:

Kadir Çakar
Mardin Artuklu Üniversitesi
39 PUBLICATIONS **91** CITATIONS

SEE PROFILE

Sehmus Aykol
Mardin Artuklu Üniversitesi
15 PUBLICATIONS **4** CITATIONS

SEE PROFILE

Understanding travellers' reactions to robotic services: a multiple case study approach of robotic hotels

Kadir Çakar[a*]

&

Şehmus Aykol[a]

[a]*Mardin Artuklu University, Mardin/Turkey*

Abstract

Purpose – The aim of the present research is to investigate travellers' behaviour and examine their reactions to high-tech hotels offering robotic services to customers.

Design/methodology/approach – Data were gathered from user-generated content (UGC) within the context of a qualitative research method by analysing the online narratives of travellers at TripAdvisor who visited robotic hotels. Data analysis was realised through content analysis, which revealed various themes and categories of traveller behaviour and reactions to technology.

Findings – Results show that robotic services significantly improve the quality of service offered to travellers, while positively affecting travellers' intention to revisit robotic hotels within the context of customer engagement behaviours (CEBs).

Research limitations/implications – The results of the present research reveal that the introduction of new technologies in the service industry, such as the robotic butler, can have considerable effects on guest behaviour and attitudes. This field has emerged as a new sub-dimension of customer engagement (CE).

Theoretical implications – The introduction of new technologies will result in value co-creation to customers by increasing the quality of services to them. Also, it may help to allay travellers' concerns about exposure to pandemics during health-related crises; industry practitioners should consider adopting robotic services for their firms, establishments, or companies.

Practical implications – The use of robots will most likely enhance experiences through interaction between customers and robots. Additionally, in cases where social distancing is required, the use of robots in the hospitality and tourism industry may increase the mobility of people wishing to travel by applying social distancing through use of robots in services.

Originality/value – The study contributes to the extant literature by identifying the concept of adoption as a sub-dimension deriving from human–robot interaction, thus generating the novelty of the research.

Keywords – Robotic services, Service robots, Customer engagement, Customer behaviour

Paper type – Case study

[*]*Corresponding author: Dr. Kadir Çakar*
*** Email: kadircakar@edu.tr*

1. Introduction

It is assumed that tourism in the future will take place in an economy in which robots, artificial intelligence, and automation technologies (RAIA) will replace human labour. This has been dubbed the so-called 'robonomic' economy, a buzzword referring to a robot-based economy (Ivanov, 2019; Webster and Ivanov, 2019). Technologies can shift tourism management and marketing from a static and utilitarian understanding to a transformative process in which tourism markets and actors both affect and are affected by developing technology (Sigala, 2018). According to Bitner *et al.* (2000), both employees and customers can apply technology as a facilitator of service encounter satisfaction. Recent developments in information technology and the use of new ways of communication have given rise to significant shifts in consumer behaviour in the hospitality and tourism sector (Cantallops and Salvi, 2014). New web-based and mobile technologies have become crucial factors in influencing travel behaviour by ensuring visitors have access to information, as well as providing facilities to purchase remote tourism products (Gretzel *et al.*, 2006). Artificial intelligence (AI) and the use of automated robots in the hospitality, service, and travel industries are regarded as the main examples of such technology (Brady, 2019; Ivanov, 2017; Manning, 2019).

More recently, robots have come into prominence within the hotel industry in the area of delivering service, with several hotels using them as waiters, butlers, and housekeepers. Some hotels, such as the Hotel Jen group, the Park Avenue Rochester, Singapore, the Sofitel hotel group, and the Millennium hotel group – including the M Social Singapore, the M Hotel Singapore, and the Studio M Hotel Singapore – have started adopting the practice of robots serving guests (Post, 2019). In a similar manner, the general use of robots in the hospitality and tourism sector is becoming increasingly important (Murphy *et al.*, 2017). This has become the case particularly after the COVID-19 outbreak, which not only accentuated the current use of robots in daily routine work but also suggests the potential use of robots in many different areas (Ivanov *et al.*, 2017) such as delivery, entertainment, housekeeping, guiding, and security (Go *et al.*, 2020). Thus, it is also expected that this outbreak will drive the adoption of using robots for multiple purposes throughout the entire hotel industry to mitigate the risks of infection transmission (Min, 2020).

Robots are being used for different purposes (Ivanov *et al.*, 2018) ranging from a robotic service butler (Bhaumik, 2018; Pinillos *et al.*, 2016) to a bellboy at the front desk

(Rodriguez-Lizundia *et al.*, 2015). Besides, in airports robots are being utilised to help passengers find their way around (Holley, 2019). Another example of this shift is that traveller attitudes towards booking a hotel have drastically changed which is regarded as a key factor. Managing such behaviour seems to be essential in order to implement sustainable marketing strategies (Casaló *et al.*, 2015). Supporting tools information and communication technologies (ICTs) have changed consumer behaviour, as well as accelerated the transformational process of future marketing. It allows users to express individual needs and expectations, while destinations can respond to travellers' requirements by offering them high quality products and services (Buhalis and Michopoulou, 2011; Law *et al*., 2014).

The aim of this study is to investigate the adoption of new technology and its effects on travellers visiting Aloft Cupertino in California, the Henn-na Hotel in Tokyo, and Residence Inn Hotel in Los Angeles by analysing their experiences and reactions to such new technology. The study also strives to reveal travellers' reflections about new technologies and customer-to-machine interaction in terms of customer engagement behaviours (CEBs), i.e., the major motivators of intention to revisit and willingness to recommend to others as regards their future decision-making processes.

By employing a multiple case study approach using user-generated content (UGC), the aims of the present research are as follows:

- to investigate customers' reactions to robotic services offered by high-tech hotels; and
- to explore the effects of robotics on customer/traveller behaviours and attitudes in the hospitality and service industry.

This paper consists of four main sections. Section 2 outlines the literature review concerning the use of robots and consumer behaviour in the hospitality and tourism sector. Section 3 describes the methodology used, while an assessment of the findings is presented in Section 4. The final section covers the study's implications and suggestions for future research.

2. Literature review

2.1 Use of robots and consumer behaviour in hospitality and tourism

The innovations of Web 2.0 and ICTs have led to social media becoming a very popular application for travellers, as well as for tourism marketing (Kang and Schuett, 2013). Particularly, the emergence of Web 2.0 and online user-generated content has affected both

consumer behaviour (tourist behaviour) and the decision making of internet users (Ye *et al*., 2011) by enhancing their ability to be involved in new service development (Sigala, 2012).

Several theoretical approaches have been developed to understand individuals' acceptance and use of technology-related applications, such as the technology adoption or acceptance model (TAM) (Davis, 1985; Kim *et al*., 2008b), the theory of planned behaviour (TPB) (Ajzen, 1991; Han *et al*., 2010), social influence theory (Crano, 2000; Kang and Schuett, 2013) and customer engagement behaviours (CEB) (Brodie *et al*., 2011; Hollebeek, 2011; Van Doorn *et al*., 2010). For instance, customer engagement with automated service interactions is estimated to increase in the near future and thus a new form of service involving customer-to-machine interaction is expected to replace the traditional customer-to-employee service interaction (Foster *et al*., 2017; Hollebeek *et al*., 2016; Marinova *et al*., 2017; Shi *et al*., 2015).

In the present era, travellers are more inclined to receive personalised services and, as a result, hotel establishments are being designed to provide more technology-oriented services than ever before. Given that changing travel behaviour encompasses some specific characteristics, the new tourist profile is that of an individual who (Werthner and Klein, 1999, p. 258):

- is more likely to ask for better service,
- expects more specific offers related to both content and their entire arrangement,
- is becoming more mobile and critical–which includes having a low level of loyalty,
- is more price sensitive rather than requesting more offers,
- shows a tendency to take more but shorter vacations and then decides to reduce the time between reservation and consumption.

Such emerging consumer behaviour precipitates people into searching for online information and interacting virtually with each other, along with shopping and living online (Amaral *et al*., 2014). Thus, it is crucial for destination marketers and managers to understand new online search behaviour in providing quality services and products that can enable them to meet the needs and desires of their consumers (Buhalis and Licata, 2002; Law *et al*., 2009). Shared experiences of travellers through social media are treated as one of the most significant facets of customers, travel, and tourism-related establishments (Kang and Shuett, 2013). Furthermore, a new technology-oriented customer/traveller has emerged: one who shows a tendency to use technology-led travel applications through mobile devices. This has

been found to be one of the most significant factors enabling travellers to access information and share their experiences (Lu *et al*., 2015). This newly emerging behaviour can be explained at an individual level through the technology acceptance model (TAM), as the use of technology, or online consumer behaviour, is largely based on the assumptions of perceived ease of use and usefulness (Kim, Lee, and Law, 2008; Kumar and Mukherjee, 2013). TAM is regarded as one of the most prominent models in explaining the adoption of new ICT use or behaviour, like mobile commerce (Chung and Koo, 2015; Kim *et al*., 2007). TAM, which has been developed to understand the behavioural intention of customers who use technology, postulates that attitude and subjective norms have an influence on behavioural intention, which subsequently affects the reaction of an individual (Shin and Kim, 2008).

On the other hand, the concept of customer engagement (CE), which has ties with the theory of service-dominant (S-D) logic (Hollebeek *et al*., 2016), can be identified as the interactive process in which experience and value co-creation coexist, and has received prominence over the last years in relation to marketing and service management perspectives (Brodie *et al*., 2011). As such, CEB as an emerging phenomenon covers a variety of behaviours, such as WOM, recommendations, helping other consumers, blogging, writing reviews, and engaging in legal activities. Moreover, the behavioural outcome can include positive posting, which signals a positive brand message on a blog, as well as negative posts that mirror coordinated community movements opposed to a company (Van-Doorn *et al*., 2010).

CE encompasses five basic dimensions known specifically as enthusiasm, attention, absorption, interaction, and identification (So *et al*., 2014). Each dimension has different characteristics, which play a role in forming the customer engagement process related to a brand or firm beyond purchase, and which is comprised of cognitive, emotional, behavioural, and social components (Brodie *et al*., 2011; Dessart *et al*., 2015; Harrigan *et al*., 2017; Hollebeek, 2011; Islam *et al*., 2018; Vivek *et al*., 2012). It can be suggested that the theoretical background of CE may be described by underscoring theory addressing interactive experience and value co-creation and in terms of marketing relationships (Brodie *et al*., 2011). In addition to these basic dimensions, CE also includes several different objects of engagement, such as organisation, brand, firm, product, or service. Besides, it can also be presumed that CE may be subject to one or more objects, as the existing literature offers both unidimensional and multidimensional aspects to the approach (Dessart *et al*., 2015; Vivek *et al*., 2014).

Considering the above-mentioned statements, it has been confirmed by previous studies that the common and intense use of social media for gathering travel information, including before, during, and after crisis events, has largely increased (Reuter *et al*., 2018). More concretely, previous research has shown that a person's characteristics can significantly influence traveller information search behaviour (Murphy *et al*., 2007). As a consequence, there are many factors that significantly influence travellers' consumer behaviour regarding tourism products and services offered by the hotel establishments they visit.

2.2 Robotic services in the hospitality and tourism industry

The interaction between the robot and its environment, including interaction with other robots, first emerged when researchers began using robots in daily life (Fong *et al*., 2003; Wolbring and Yumakulov, 2014). Subsequently, the design of such androids concentrated on a humanlike realistic appearance and the simulation of a few human movements, which differed from later research dealing with (AI) (Dautenhahn, 2007). By the end of the twentieth century, the first stream of practical robots was created to implement mundane montage and construction tasks on factory floors (Cabibihan, 2014). Recently, however, the emergence of technological developments has brought about many new service applications within the hospitality and tourism industry, such as mobile payment, the Internet of Things (IoT), Living Services, Mobility as a Service, Big Data, voice recognition, and robotic devices (Bu, 2018).

From the perspective of the hospitality and tourism sector, it is assumed that in the future robots will become more integrated within daily life, and it is predicted that the market for service robots will also develop immensely over the next twenty years (Foster *et al*., 2017). Today, the use of robots for multiple purposes (e.g., frontline services, restaurants, travel agencies, museums, etc.) has gained prominence within the hospitality and tourism industry, as within many other diverse areas (Murphy *et al*., 2017; Nakagawa *et al*., 2016). The Henn-na Hotel in Japan, which is fully run by automated humanoid robots, was the first hotel in the world to adopt robots in the tourism and hospitality sector (Chung-En, 2018). Similarly, a robotic butler distributes poolside towels and room snacks in the Aloft Cupertino in California. The robot also rides the elevators and delivers requested items to guests. Botlr, Aloft's first robotic butler, is programmed to bring towels and 'lite bites' to guests at the poolside, and to their rooms if guests need a snack or toiletries (Berman, 2017).

The contributions of robotic services to hotel establishments are manifold (see Buhalis and Sinarta, 2019; Ivanov *et al*., 2019). Their use can fundamentally increase business

performance while also enabling hotels to cope with the issues of seasonal employment and workforce utilisation (Kuo *et al.*, 2017). To that end, there are many examples regarding the use of robots in the hospitality and tourism industry (Tung and Law, 2017), such as the use of robots as waiters instead of humans in a restaurant in China (Van-Doorn *et al*., 2017), a robotic bellboy in a hotel in the USA (Murphy *et al*., 2017), service robots as frontline employees (Wirtz *et al*., 2018), a robotic butler that delivers service to hotel guests (Berman 2017; Tung and Au, 2018), and a keyless and cashless hotel in which all services are provided by robots (CNBC, 2019). Further examples of robotic use in the hospitality and tourism sector are also seen in meetings and events, theme and amusement parks, car rental services, airport services, travel agencies, tourist information centres, and museums and art galleries (Ivanov *et al*., 2017).

The use of robots in hotels has been receiving greater attention from scholars and thus the number of studies investigating the use of service robots in the hospitality and tourism industry is significantly increasing (Berezina *et al*., 2019; Ivanov and Webster, 2019a; Ivanov and Webster, 2019b). For instance, the major research papers have been designed to explore the use of robots in services from a cognition perspective (Čaić *et al*., 2019), the implementation of service-robots in the service industry (Belanche *et al*., 2020), service automation and use of robots by tourist, travel, and hospitality establishments (Ivanov *et al*., 2019), co-creation (Buhalis and Sinatra, 2019), the replacement of the human workforce with robots (Osawa *et al*., 2017), anthropomorphism (Murphy *et al*., 2019), economic aspects of service robots (Ivanov and Webster, 2019b; Ivanov and Webster, 2019c), humanlike robots as employees in the hotel industry (Yu, 2020), artificial intelligence in the service industry (Bowen and Morosan, 2018; Cain *et al*., 2019; Huang and Rust, 2018), the impacts of robotic service on customer evaluations of the hotel brand experience (Chan and Tung, 2019), using robotics in classes and research by hospitality educators (Murphy *et al.*, 2017), and the use of robots in predicting demand and production management in quick-service restaurants (Noone and Coulter, 2012).

With the emergence of the COVID-19 health crisis, awareness of using robots in hospitality and tourism has become crucial and necessary in different spheres of life such as hospitals, airports, transportation, recreation, and scenic areas including hotels and communities to effectively manage the COVID-19 pandemic as well as ensuring social distancing (Zeng *et al*., 2020). From this perspective, the transformative role of using robots has become more apparent (Brouder, 2020), which will most likely continue to affect the

entire tourism system including companies in travel, tourism, and hospitality in order to cope with the pandemic (Ivanov *et al*., 2020). Since the virus can transmit from human to human, social distancing must be enforced to ensure avoiding infection (Wen *et al*., 2020a). As a result, the COVID-19 outbreak has affected – and would seem to continue to affect – travellers' behaviour and preferences throughout their entire lives, including travel behaviour (Wen *et al*., 2020b) by stimulating and propelling them to increasingly adopt and use robots.

Even though there are many research studies in the existing literature that have examined the use of robots in hospitality and tourism, there is a rather limited body of research underscoring the experiences of travellers with robots and their behavioural reactions to robotics. Therefore, the present research is dedicated to contributing to current knowledge by filling the existing gap.

3. Methodology and research design

Various sectors tend to adopt RAIA to reduce costs, generate additional revenues, provide consistent product quality, streamline operations, expand production/service capacity, and improve a company's competitiveness (Ivanov, 2017). Like many other sectors, such as manufacturing, transportation and logistics, warehousing, agriculture, medicine, and marketing communications (Ivanov and Webster, 2017), this new trend also applies to the hospitality and tourism sector where industrial robots are used to create value. For example, Aloft Cupertino, Residence Inn, and the Henn-na Hotel are among those designed to provide services to their visitors using robots (Murison, 2016). In addition, the top five high-tech hotels in Asia – Aloft Bangkok Sukhumvit 11, Tokyo Hen-na, Grand Park City Hall, Singapore, Alibaba FlyZoo Hotel, Hangzhou, and Moon Capital Hotels – use robots through applications to serve their guests (Lo, 2019).

Table 1. Top 10 high-tech hotels around the world

Hotel	Destination
W Singapore – Sentosa Cove, Sentosa Island	Singapore
NH Collection Berlin Friedrichstrasse	Berlin/Germany
Hotel Silken Puerta Madrid	Madrid/Spain
Peninsula Hotel Tokyo	Tokyo/Japan

YOTEL New York City	New York/United States
Ecclestone Square, Pimlico	London/UK
Aloft Cupertino	California/United States
Pengheng Space Capsules Hotel	Shenzhen/China
Blow Up Hall 5050	Poznań/Poland
Hotel 1000 Seattle	Washington/United Sates

Source: (Berman, 2017)

Adopting Veal's (2006) case selection criteria, the sample was determined based on the following statements: (1) the selected hotels are ranked amongst the most high-tech in the world, having been designed to provide services to their customers using the latest technology; (2) data were conveniently collected by researchers from one of the most recognised and used travel platforms, TripAdvisor.

3.1 Data collection and analysis

In light of the research objective, this study has utilised a mixed content analysis method. In the first stage, a traditional content analysis method was performed consisting of different levels and in the second, Leximancer software was used for a qualitative analysis of data utilising a quantitative method approach (Spasojevic *et al*., 2018).

UGC reviews, based on online visitor comments, are useful as they allow travellers to make informed decisions prior to their trip by flagging bad products and services, as well as influencing other choices and perceptions (Filieri *et al.*, 2015; Tung and Au, 2018). One of the most popular user-generated sources and online travel communities is TripAdvisor, through which travellers can collect and convey their experiences with reviews, ratings, photos, and videos during or after their travel experiences (Lee *et al*., 2011; O'Connor, 2010; Xiang and Gretzel, 2010). Therefore, in order to achieve the aims and objectives of this study, user-generated content was considered in the first stage based on the reviews of travellers visiting Aloft Cupertino (n = 235) in California, USA, the Henn-na Hotel (n = 29) in Tokyo, Japan, and Residence Inn (n = 300) in Los Angeles, USA, which was retrieved from the TripAdvisor travel platform. Data were collected during the period September to February 2017, and in May 2019.

Table 2. Number and dates of reviews for each robotic hotel

Hotels	Number of retrieved reviews /Total reviews	First date of reviews	Last date of reviews
Aloft Cupertino California	235/300	February 2013	August 2017
Henn na Hotel Tokyo	28/33	October 2015	January 2019
Residence Inn L.A.	300/497	March 2017	April 2019

Based on the basic types of engagement (Harrigan *et al*., 2017), deductive content analysis was utilised to analyse the data, which was implemented by two independent researchers following several steps. Deductive content analysis is a technique that allows the researcher to check whether data is congruent with previous expectations, theories, or hypotheses described or extracted (Thomas, 2006). During this first step of the data analysis process, researchers transcribed online reviews of travellers visiting Aloft Cupertino from TripAdvisor. The second stage covered the coding process, which was independently carried out by the researchers. After the coding process was finalised and, in order to prevent confusion, researchers combined common categories with synonyms that fell under the main themes, which were coded considering a set of common factors (Lamberton and Stephen, 2016). For instance, 'cool tech', 'high-tech', 'modern', and 'contemporary' as relevant codes were classified under the category identifying positive experiences of travellers in high-tech hotels offering a robotic butler service. In the determination of main themes and categories, researchers strived to come to a consensus regarding distinctions, and later categories were reduced as more codes emerged in the first stage of data analysis (Tung and Au, 2018; Xiang and Gretzel, 2010).

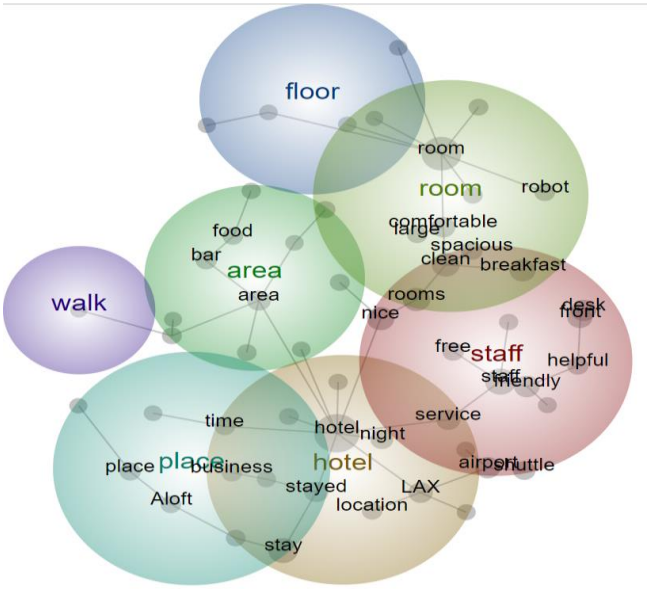
In the second stage, Leximancer, automatic content analysis software that allows researchers to count word frequency and analyse the meaning of texts by creating frequently used concepts, was employed (Scott *et al*., 2019). Moreover, Leximancer software presents both conceptual and relational analyses, measuring not only the existence of described codes or concepts within texts or narratives, but also the ways in which extracted concepts are connected to each other (Brochado *et al*., 2019). Unlike other software programmes, Leximancer does not compute word frequency or the coding of terms and phrases. Instead, based on its own algorithms, Leximancer software analyses the meanings within passages of text by eliciting the major concepts and ideas (Tseng *et al*., 2015). Since it provides better results and a deeper understanding, and can extract meaningful concepts relating to visitors'

experiences left on travel blogs, Leximaner software has been increasingly used in the field of tourism for the qualitative analysis of trip experiences (e.g., Kolar, 2019; Mehran and Olya, 2019; Moyle *et al*., 2014; Phi, 2019).

4. Findings

This section is split into two main parts. The first encompasses the results derived from the content analysis of travellers' online narratives through using the Leximancer software. Overall, the content analysis of qualitative data created seven major themes using a concept map, which can be referred to as the key dimensions of robotic experiences: staff (1,158 occurrences), hotel (1,102 occurrences), room (828 occurrences), area (246 occurrences), place (240 occurrences), floor (63 occurrences), and walk (43 occurrences).

Figure 1. Concept map of robotic service experiences



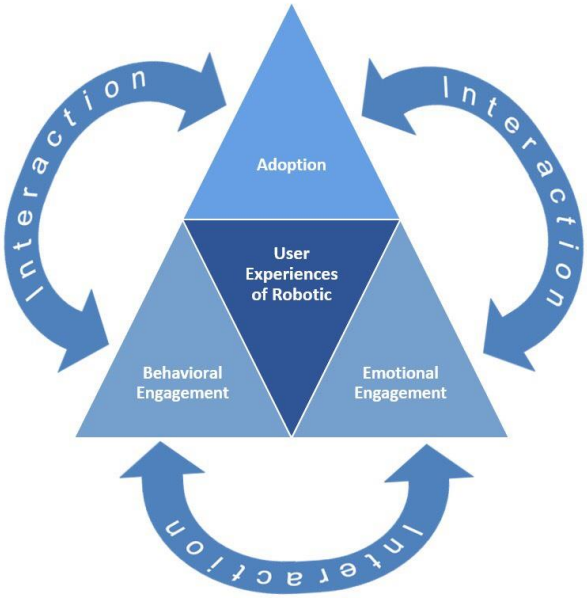
In the second part, an analysis of travellers' online reviews was clustered into three basic themes addressing their reactions and behavioural attitudes to robotic services. The main themes revealed were adoption, behavioural engagement (interaction), and emotional engagement (affection). The results obtained from the online narratives of travellers, relating to robotic service experiences, are presented in Figure 2.

4.1 Adoption

This category is closely related to the delivery services provided by the robot Botlr and mostly conveyed positive traveller experiences. The adoption of any technological development is

concerned with the degree to which customers enjoy the innovation, as in the case of high-tech hotels offering robotic services as described in this study. It is also considered a significant dimension of customer engagement towards robotic services alongside the important area of research that needs to be further examined (Ivanov and Webster, 2019b; Ivanov *et al*., 2019).

Figure 2. Customer engagement with the robotic service experience



The adoption theory strives to explain the preferences of an individual and the reasons behind a person engaging with or refusing any innovation (Straub, 2009). This concept can also be explained through the TAM, which closely affects a person's decision to adopt a new technology (Kaushik *et al*., 2015) and posits the perceived ease of use and usefulness of approach (Kim *et al.*, 2008a). Positive feelings referring to adoption resulting from travellers' experiences that were most frequently stated were 'amazing', 'very cool', 'modern', and 'very high-tech'. One of the travellers described his/her positive engagement with the robotic butler as follows:

'A robot butler that brought me items to my room, very cool!'

Considering the comments that travellers left in their online narratives, one can assert that quality experience, which depends on the degree of robotics adoption (Xiao and Kumar, 2019), needs to be treated as one of the most significant elements amongst others as it drives

the adoption of a robotics service for customers. The positive adoption of a robotic butler service was also voiced by another traveller who wrote:

'The cool thing about this hotel is the robot that can deliver things to your room'.

It can also be claimed that the positive attitude and responsiveness of travellers towards using robotic services and this kind of technological development reflects an improved customer experience, as well as creating value for travellers. As a consequence, it can be posited that regarding the product and service quality, the adoption of robots will likely shift customers' expectations concerning what forms a travel, tourism, and hospitality product (Ivanov, 2019).

4.2 Behavioural engagement

Behavioural engagement, considered as one of the most fundamental variables and elements of customer engagement, refers to the willingness of customers to adopt a brand or firm (Dessart *et al*. 2015). It is regarded as one of the major components of CE along with a cognitive, emotional, and social component (Vivek *et al*., 2012). Under this theme, interaction was extracted as the category most frequently used by travellers.

4.2.1 Interaction

Interaction signals one of the behavioural dimensions of engagement, which refers to 'the two-way communications between a focal engagement subject and object' (Brodie *et al*., 2011, p. 257). It is considered as one of the chief tenets, as well as behavioural components, of customer engagement (Harrigan *et al*., 2017). It should also be considered as one of the most influential factors, mutually created through the interaction between robots and customer, and co-created by manifold actors, one of which – the customer as beneficiary – is playing a key role as a co-creator of value (Kunz *et al*., 2017). The category of interaction has been found to be one of the main motivational drivers of CEB, as it positively affects the revisit intention of travellers and creates a willingness to recommend to others in terms of their future decision-making for a trip. Regarding this issue one traveller shared:

'My children enjoy ordering from BOTLR the robot as well'.

This comment clearly refers to feelings of satisfaction and pleasure in terms of the use of robotic services (Dessart *et al*. 2015). Related to this, one traveller also approved of the way services were delivered by:

'an incredibly cute robot that delivers orders to your room, using the elevator and getting to your room's door, unaccompanied by any human'.

Overall it can be deduced from the above statements that the high level of interaction between humans and robots may create greater levels of engagement, which can encourage curiosity and questing of functionality (Cain *et al*., 2019). Furthermore, it is worth considering that the interaction between the robots and consumers greatly impact consumer perceptions and their level of service satisfaction (Go *et al*., 2020).

4.3 Emotional engagement

Engagement involves a psychological state that mirrors a customer's specific psychological condition stimulated by their interactive experiences with a central engagement object (Kunz *et al*., 2017). Emotional engagement, which is seen as one of the integral elements of CE, reflects a transmissible feature emanating from human–robot interaction (Stock 2016). Travellers' online narratives have shown substantial emotional ties with robotic butlers. Overall, travellers' experiences revealed positive emotional responses arising from such interaction. This kind of customer engagement is mostly conveyed as affective responses to the robotic butler. Therefore, traveller experience relating to emotional engagement needs to be assessed as an integral part of the user experience of robotic butlers and is thus linked to the affective dimension.

4.3.1 Affection

Employees working in the hospitality sector and customers receiving services are both concerned with the process in which they interact with each other in the creation of a hospitality product (Bowen and Morosan, 2018). However, in order to provide services, robots were designed and programmed to respond to human affections through human–robot interaction (Broekens, 2007), which was described by Stock (2016) as a robot-centric perspective to reveal emotions in a similar way to humans while deploying affective responses to humans by means of simulation (Fong *et al*., 2003). Another traveller commented on this issue as follows:

'My boys were sorry to say goodbye to BOTLR and we will recommend this place to our friends'.

This positive emotional response can be related to approaches. First, customers build a strong affectionate link with service firms while outstanding service spurs customer–firm affection in the second step. In a subsequent step, customer–firm affection is a likely attainable goal that may offer the missing link to loyalty in services (Yim *et al*., 2008). Similar affective evidence resulting from the emotional engagement of travellers with robots is also seen in this visitor's comment:

'The "Botlr" is a robot butler that will deliver things to you upon request, such as extra shampoo, towels, snacks, etc. It was the highlight of our trip'.

While robotic services can improve the traveller's trip by creating value for money, they can also be seen as a key driver in creating memorable experiences, as well as playing a crucial role in transforming the value of a service experience through human–robot interaction (Blocker and Barrios, 2015; Tung and Au, 2018). Other travellers reviewed their opinions as follows:

'It was a very pleasant stay with a fun "robot" delivery experience'.

'We loved the robot in our room and the face technology that allows you to enter the room. The rooms were very clean and comfortable'.

Considering the above comments, it can be claimed that using a robotic butler created additional value to customers resulting from human–robot interaction. This kind of value, based on the services of a robot, also proves that the robotic-service experience can be one of enjoyment, sociability, and companionship (De Graaf and Allouch, 2013). Moreover, robotic services can be treated as one of the most significant factors that drives and transforms traditional customer service experiences into meaningful ones, through social encounters between humans (customers) and robots (Van-Doorn *et al*., 2017). To this end, it can be claimed that customer engagement (referring to a psychological process and involving cognitive and emotional facets) can engender loyalty for both new and real (existing) customers (Kunz *et al*., 2017).

5. Conclusions

The specific objective of this research paper was to examine the effects of robotic services and their impact on traveller behaviour, which can subsequently influence their decision-making process. Moreover, in the present research, attention has been drawn to the role of modern technology and its impact on guests in the service industry within the marketing

domain by collecting data from one of the most popular internet platforms, TripAdvisor. Overall, based on the study findings, this paper proposes a conceptual model of CEB with robotic service experiences within the hospitality and tourism sector.

By contributing advantageous insights to the extant literature, this paper presents useful conclusions (in line with the concept of CEBs) for the future of both tourism marketers and managers of hotels and industry practitioners. First, the results of the study show that the application of robots in hotels can have compelling positive effects on guest satisfaction and experiences, which subsequently can influence their decision-making in terms of revisit intention. Most importantly, the study contributes to the extant literature by identifying the concept of adoption as a sub-dimension deriving from human–robot interaction, thus generating the novelty of the research.

The findings of the present study support the view that the use of information technologies and their impact on travellers, as well as potential travellers, play a key role in marketing tourism destinations. To this end, it can be concluded that robotic services based on new technologies can positively affect guests' attitudes by improving their level of satisfaction. This postulation can be linked to the stance that the interaction between the robots and consumers substantially affects not only consumer perceptions, but also service satisfaction (Go *et al*., 2020). Within the context of CEB, behavioural indications of travellers were positive to a large extent, in particular through electronic word of mouth (eWOM) and recommendations to others via online reviews and comments, which stemmed from a high level of satisfaction based on the high-tech hotel experience they received (Van-Doorn *et al*., 2010). These results can be confirmed and supported by findings that customers structure strong affectionate connections with service firms and remarkable service fosters affection between customer and firm (Yim *et al*., 2008).

The study results also supported the finding that customer engagement has a substantial impact on the co-creation process of traveller experience, which also coincides with prior research findings (Brodie *et al*., 2011; Hollebeek *et al*., 2016). One of the most important findings of the current study is that the robotic service experience is mostly congruent with the object of service engagement rather than the product, one amongst many modes of engagement (Dessart *et al*., 2015), since the interaction process amongst customers and robotics is treated as the key driver of this kind of engagement stemming from human–robot interaction (Tung and Au, 2018).

The study findings also reveal that experiences based on traveller interaction with service robots reflect mostly a single object of customer engagement, as well as offering multidimensional aspects (e.g., social, emotional, and behavioural interaction) of CE (Dessart *et al*., 2015; Vivek *et al*., 2014), while additionally positing adoption as an emerging sub-dimension of CE. As such, this kind of interrelatedness between adoption, customer engagement, and interaction can be explained and supported through a concept that can also be explained through the TAM, which intimately influences a person's decision to adopt a new technology (Kaushik *et al*., 2015), and postulates the perceived ease of use and perceived usefulness approaches (Kim *et al.,* 2008a). Using robots in services significantly influenced travellers' behaviours and attitudes in a positive way, which subsequently impacted behavioural intentions of customers to use robots, thus eliciting more customer engagement with robots. This kind of customer engagement with robotic services – which is spawned from interaction between customers and robots – is emanating from a high degree of adoption. In addition, the degree of customers' adoption helps to explain the preferences of an individual and the reasons behind a person engaging with, or refusing, any innovation (Straub, 2009). Customer adoption is also considered to be a vital element of customer engagement towards robotic services (Ivanov and Webster, 2019b; Ivanov *et al*., 2019).

Service robots can also have a positive impact on value creation, as well as playing a crucial role in transforming the value of a service based on S-D logic, which subsequently engenders loyalty, triggering intention to revisit (Blocker and Barrios, 2015). Nevertheless, the results of the present study have also indicated that traditional hotel experiences cannot be completely substituted from the traveller's point of view because robots still do not have the capability to show real human qualities such as emotion (Murison, 2016). This is despite the fact that the vast majority of guests visiting hotels using robots experienced high levels of satisfaction from the service, which has also been confirmed by previous research.

Some travellers described negative experiences, mainly resulting from traditional facilities and a small room design, whilst other consumers felt that the enjoyment and pleasure derived from receiving robotic butler services predominantly arose from the human–robot interaction. This is evidence that service robots can facilitate the reconstruction of traditional experiences by transforming the value of the service experience (Blocker and Barrios, 2015).

5.1 Theoretical implications

One of the most notable and compelling implications of the present research is that it has revealed the current use and adoption of robots in many different areas of the hospitality industry and has created value for customers (Ivanov *et al*., 2017). Industry practitioners will most likely be stimulated towards the use and adoption of robotic technology in all areas of travel, tourism, and hospitality industries while striving to strengthen their establishments' technological infrastructure by investing more in technology. While robotic applications were previously only a preference for establishments in order to make a difference, the use of them would appear to be a necessity in the near future. As the study findings support, since the consumer adoption and use of robotic service technologies drive their use, investing in technology in tourism and hospitality industries should be encouraged. As a result, another practical implication of the research is that hotel managers need to be aware of the benefits of using robotics in their establishments in order to improve the innovative service experiences of customers while at the same time gaining competitive advantages in the market.

5.2 Practical implications

From a social implications perspective, health crises and related issues that society may face in all spheres of life during and in the aftermath of COVID-19 will entail social distancing and increased physical distance between people. This will likely accelerate the use of robotic services in the hospitality and tourism industry, and the use of robots for routine tasks will become more conspicuous (Ivanov *et al*., 2017). From a practical perspective, industry practitioners can then deploy robots in many roles to implement and carry out different physical tasks that were previously the domain of humans (Royakkers and van Est, 2015). This could engender a new impetus for the way the hospitality and tourism industry operates as a whole. In this vein, it is worth noting that robots will dominate the current service delivery systems; this will entail the creation of new robot-led systems as machines continue to replace humans (Bowen and Morosan, 2018). The originality of the present study relies on its contribution to the increasing recognition of the significance of the use of robotics in hospitality and tourism. Thus, this qualitative research was dedicated to revealing deeper

insights into the use of robots by firms and companies that are operating in travel, tourism, and hospitality.

5.3 Limitations and future research directions

The present research used the TripAdvisor online reviews of travellers visiting high-tech hotels as a source of UGC. The main limitation of the study is that the analysis is based on a small number of travellers from selected hotels, so results cannot be generally applied within the wider context. Future research studies should be conducted to explore and better understand the motivations of travellers visiting high-tech hotels providing robotic services. Furthermore, using a quantitative research method, researchers should also investigate to what extent the adoption of automated services can play a role in improving customer experience.

References

Ajzen, I. (1991), "The theory of planned behavior", *Organizational Behavior and Human Decision Processes*, Vol. 50 No. 2, pp.179-211.

Amaral, F., Tiago, T., and Tiago, F. (2014), "User-generated content: tourists' profiles on Tripadvisor", *International Journal of Strategic Innovative Marketing*, Vol. 1 No. 3, pp.137-145.

Belanche, D., Casaló, L.V., Flavián, C., and Schepers, J. (2020), "Service robot implementation: a theoretical framework and research agenda", *The Service Industries Journal*, Vol. 40 Nos. 3-4, pp.203-225.

Berezina, K., Ciftci, O., and Cobanoglu, C. (2019), "Robots, Artificial Intelligence, and Service Automation in Restaurants", Ivanov, S. and Webster, C. (Ed.s), *Robots, Artificial Intelligence, and Service Automation in Travel, Tourism and Hospitality*, Emerald, London, pp.185-219.

Berman, J. (2017), "Top ten high-tech hotels around the world", available at: https://www.smartmeetings.com/technology/96753/top-10-high-tech-hotels-world (accessed 5 March 2018)

Bhaumik, A. (2018), *From AI to Robotics: Mobile, Social, and Sentient Robots*, CRC Press, Boca Raton, FL.

Bitner, M.J., Brown, S.W., and Meuter, M.L. (2000), "Technology infusion in service encounters", *Journal of the Academy of Marketing Science*, Vol. 28 No. 1, pp.138-149.

Blocker, C.P. and Barrios, A. (2015), "The transformative value of a service experience", *Journal of Service Research*, Vol. 18 No. 3, pp.265-283.

Bowen, J. and Morosan, C. (2018), "Beware hospitality industry: the robots are coming", *Worldwide Hospitality and Tourism Themes*, Vol. 10 No. 6, pp.726-733.

Buhalis, D. and Sinatra, Y. (2019), "Real-time co-creation and nowness service: lessons from

tourism and hospitality", *Journal of Travel & Tourism Marketing*, Vol. 36 No. 5, pp.563-582.

Brady, S. (2019), "Hate flying but love travel? This airline will send an avatar in your place", available at: https://www.lonelyplanet.com/articles/all-nippon-airways-newme-robot (accessed 21 October 2019)

Brochado, A., Stoleriu, O., and Lupu, C. (2019), "Wine tourism: a multisensory experience", *Current Issues in Tourism*, DOI: 10.1080/13683500.2019.1649373.

Brodie, R.J., Hollebeek, L.D., Jurić, B., and Ilić, A. (2011), "Customer engagement: conceptual domain, fundamental propositions, and implications for research", *Journal of Service Research*, Vol. 14 No. 3, pp.252-271.

Broekens, J. (2007), "Emotion and reinforcement: affective facial expressions facilitate robot learning", Huang T.S., Nijholt A., Pantic M., and Pentland A. (Ed.s), *Artifical Intelligence for Human Computing*, Springer, Berlin, pp. 113-132.

Brouder, P. (2020), "Reset redux: possible evolutionary pathways towards the transformation of tourism in a COVID-19 world", *Tourism Geographies*, DOI: 10.1080/14616688.2020.1760928.

Bu, N. (2018), "The 22nd Session of the UNWTO General Assembly–special Session on Smart Tourism: Chengdu, China, 14–15 September 2017", *Anatolia*, Vol. 29 No. 1, pp.143-145.

Buhalis, D. and Licata, M.C. (2002), "The future eTourism intermediaries", *Tourism Management*, Vol. 23 No.3, pp.207-220.

Buhalis, D. and Michopoulou, E. (2011), "Information-enabled tourism destination marketing: addressing the accessibility market", *Current Issues in Tourism*, Vol. 14 No. 2, pp.145-168.

Cabibihan, J.J., Williams, M.A., and Simmons, R. (2014), "When robots engage humans", *International Journal of Social Robotics*, Vol. 6 No. 3, pp.311-313.

Čaić, M., Mahr, D., and Oderkerken-Schröder, G. (2019), "Value of social robots in services: social cognition perspective", *Journal of Services Marketing*, Vol. 3 No. 4, pp.463-478.

Cain, L.N., Thomas, J.H., and Alonso Jr, M. (2019), "From sci-fi to sci-fact: the state of robotics and AI in the hospitality industry", *Journal of Hospitality and Tourism Technology*, Vol. 10 No. 4, pp.624-650.

Cantallops, A.S. and Salvi, F. (2014), "New consumer behavior: a review of research on eWOM and hotels", *International Journal of Hospitality Management*, Vol. 36, p.41-51.

Casaló L.V., Flavian, C., Guinaliu, M., and Ekinci, Y. (2015), "Do online hotel rating schemes influence booking behaviors?", *International Journal of Hospitality Management*, Vol. 49, pp.28-36.

Chan, A.P.H. and Tung, V.W.S. (2019), "Examining the effects of robotic service on brand experience: the moderating role of hotel segment", *Journal of Travel & Tourism Marketing*, Vol. 36 No. 4, pp.458-468.

Chung, N. and Koo, C. (2015), "The use of social media in travel information search", *Telematics and Informatics*, Vol. 32 No. 2, pp.215–229.

Chung-En, Y. (2018), "Humanlike robot and human staff in service: age and gender

differences in perceiving smiling behaviors", *ICITM: 2018, 7th International Conference on Industrial Technology and Management*, Oxford, pp.99-103.

CNBC (2019) "Alibaba's keyless and cashless hotel is straight out of the future", available at: https://www.cnbc.com/video/2019/10/02/alibabas-keyless-and-cashless-hotel-is-straight-out-of-the-future.html (accessed 5 October 2019)

Crano, W. D. (2000), "Milestones in the psychological analysis of social influence", *Group Dynamics: Theory, Research, and Practice*, Vol. 4 No. 1, pp.68-80.

Dautenhahn, K. (2007), "Socially intelligent robots: dimensions of human–robot interaction", *Philosophical Transactions of the Royal Society B: Biological Sciences*, Vol. 362 No. 1480, pp.679-704.

Davis, F.D. (1985), "A technology acceptance model for empirically testing new end-user information systems: theory and results", Ph.D. Diss, Massachusetts Institute of Technology, Boston.

De Graaf, M.M. and Allouch, S.B. (2013), "Exploring influencing variables for the acceptance of social robots", *Robotics and Autonomous Systems*, Vol. 61 No. 12, pp.1476-1486.

Dessart, L., Veloutsou, C., and Morgan-Thomas, A. (2015), "Consumer engagement in online brand communities: a social media perspective", *Journal of Product & Brand Management*, Vol. 24 No.1, pp.28-42.

Filieri, R., Alguezaui, S., and McLeay, F. (2015), "Why do travelers trust TripAdvisor? Antecedents of trust towards consumer-generated media and its influence on recommendation adoption and word of mouth", *Tourism Management*, Vol.51, pp.174-185.

Fong, T., Nourbakhsh, I., and Dautenhahn, K. (2003), "A survey of socially interactive robots", *Robotics and Autonomous Systems*, Vol. 42 Nos. 3-4, pp.143-166.

Foster, M.E., Gaschler, A., and Giuliani, M. (2017), "Automatically classifying user engagement for dynamic multi-party human–robot interaction", *International Journal of Social Robotics*, Vol. 9 No. 5, pp.659-674.

Go, H., Kang, M., and Suh, S.C. (2020), "Machine learning of robots in tourism and hospitality: interactive technology acceptance model (iTAM)–cutting edge", *Tourism Review*, DOI: 10.1108/TR-02-2019-0062.

Gretzel, U., Fesenmaier, D.R., and O'Leary, J.T. (2006), "The Transformation of Consumer Behaviour", Buhalis, D. and Costa, C. (Eds), *Tourism business frontiers*, Butterworth-Heinemann, Oxford, pp.9-18.

Han, H., Hsu, L.T.J., and Sheu, C. (2010), "Application of the theory of planned behavior to green hotel choice: testing the effect of environmental friendly activities", *Tourism Management*, Vol. 31 No. 3, pp.325-334.

Harrigan, P., Evers, U., Miles, M., and Daly, T. (2017), "Customer engagement with tourism social media brands", *Tourism Management*, Vol. 59, pp.597-609.

Hollebeek, L. D. (2011), "Demystifying customer brand engagement: exploring the loyalty nexus", *Journal of Marketing Management*, Vol. 27 No. 7-8, pp.785-807.

Hollebeek, L. D., Conduit, J., & Brodie, R. J. (2016). "Strategic drivers, anticipated and unanticipated outcomes of customer engagement", *Journal of Marketing Management*, Vol. 32 Iss. 5-6, pp. 393-398.

Hollebeek, L.D., Srivastava, R.K., and Chen, T. (2019), "SD logic–informed customer engagement: integrative framework, revised fundamental propositions, and application to CRM", *Journal of the Academy of Marketing Science,* Vol. 47 No. 1, pp.161-185.

Holley, P. (2019), "Istanbul's new airport is one of the world's largest. A fleet of humanoid robots is helping passengers find their way around", available at: https://www.washingtonpost.com/technology/2019/10/01/instanbuls-new-airport-is-one-worlds-largest-fleet-humanoid-robots-is-helping-passengers-find-their-way-around/ (accessed 5 October 2019)

Huang, M.H. and Rust, R.T. (2018), "Artificial intelligence in service", *Journal of Service Research,* Vol. 21 No. 2, pp.155-172.

Islam, J.U., Rahman, Z., and Hollebeek, L.D. (2018), "Consumer engagement in online brand communities: a solicitation of congruity theory", *Internet Research,* Vol. 28 No.1, pp.23-45.

Ivanov, S. (2017), "Robonomics - principles, benefits, challenges, solutions", *Yearbook of Varna University of Management*, Vol. 10, p.283-293.

Ivanov, S. (2019), "Ultimate transformation: how will automation technologies disrupt the travel, tourism and hospitality industries?", *Zeitschrift für Tourismuswissenschaft*, Vol. 11 No. 1, pp.25-43.

Ivanov, S., Gretzel, U., Berezina, K., Sigala, M. and Webster, C. (2019), "Progress on robotics in hospitality and tourism: a review of the literature", *Journal of Hospitality and Tourism Technology*, Vol. 10 No. 4, pp.489-521.

Ivanov, S. and Webster, C. (2019a), "Conceptual framework of the use of robots, artificial intelligence and service automation in travel, tourism, and hospitality companies", Ivanov, S. and Webster, C. (Ed.s), *Robots, Artificial Intelligence, and Service Automation in Travel, Tourism and Hospitality*. Emerald, London, pp.7-37.

Ivanov, S. and Webster, C. (2019b), "Robots in tourism: A research agenda for tourism economics", *Tourism Economics*, DOI: 10.1177/1354816619879583.

Ivanov, S. and Webster, C. (2019c), "Economic fundamentals of the use of robots, artificial intelligence, and service Automation in travel, tourism, and hospitality", Ivanov, S. and Webster, C. (Ed.s), *Robots, Artificial Intelligence, and Service Automation in Travel, Tourism and Hospitality*. Emerald, London pp.39-55.

Ivanov, S., Webster, C. and Garenko, A. (2018), "Young Russian adults' attitudes towards the potential use of robots in hotels", *Technology in Society*, Vol. 55, pp.24-32.

Ivanov, S., Webster, C., Stoilova, E., and Slobodskoy, D. (2020), "Biosecurity, automation technologies and economic resilience of travel, tourism and hospitality companies", DOI: 10.31235/osf.io/2hx6f.

Ivanov, S.H., and Webster, C. (2017), "The robot as a consumer: a research agenda", *Marketing: Experience and Perspectives Conference,* University of Economics, Varna, Bulgaria, pp.71-79.

Ivanov, S.H. Webster, C., and Berezina, K. (2017), "Adoption of robots and service automation by tourism and hospitality companies", *Revista Turismo & Desenvolvimento*, Vol. 27 No. 28, pp.1501-1517.

Kang, M. and Schuett, M. A. (2013), "Determinants of sharing travel experiences in social media", *Journal of Travel & Tourism Marketing*, Vol. 30 Nos. 1-2, pp.93-107.

Kaushik, A. K., and Rahman, Z. (2015), "An alternative model of self-service retail technology adoption. *Journal of Services Marketing*", Vol. 29 No. 5, pp. 406-420.

Kim, D.Y., Park, J., and Morrison, A.M. (2008a), "A model of traveller acceptance of mobile technology", *International Journal of Tourism Research*, Vol. 10 No. 5, pp.393-407.

Kim, H.W., Chan, H.C., and Gupta, S. (2007), "Value-based adoption of mobile internet: an empirical investigation", *Decision Support Systems*, Vol. 43 No. 1, pp.111-126.

Kim, T.G., Lee, J.H., and Law, R. (2008b), "An empirical examination of the acceptance behaviour of hotel front office systems: an extended technology acceptance model", *Tourism Management*, Vol. 29 No. 3, pp.500-513.

Kolar, T. (2019), "Exploring combined tourist offerings: the case of sightrunning", *Current Issues in Tourism*, Vol. 22 No. 4, pp.400-408.

Kumar, A. and Mukherjee, A. (2013), "Shop while you talk: Determinants of purchase intentions through a mobile device", *International Journal of Mobile Marketing*, Vol. 8 No.1, pp.23-37.

Kunz, W., Aksoy, L., Bart, Y., Heinonen, K., Kabadayi, S., Villaroel Ordenes, F., Sigala, M., Diaz, D., and Theodoulidis, B. (2017), "Customer engagement in a big data world", *Journal of Services Marketing*, Vol. 31 No. 2, pp.161-171.

Kuo, C.M., Chen, L.C., and Tseng, C.Y. (2017), "Investigating an innovative service with hospitality robots", *International Journal of Contemporary Hospitality Management*, Vol. 29 No. 5, pp.1305-1321.

Lamberton, C. and Stephen, A.T. (2016), "A thematic exploration of digital, social media, and mobile marketing: research evolution from 2000 to 2015 and an agenda for future inquiry", *Journal of Marketing*, Vol. 80 No. 6, pp.146-172.

Law, R., Buhalis, D., and Cobanoglu, C. (2014), "Progress on information and communication technologies in hospitality and tourism", *International Journal of Contemporary Hospitality Management*, Vol. 26 No. 5, pp.727-750.

Law, R., Leung, R., and Buhalis, D. (2009), "Information technology applications in hospitality and tourism: a review of publications from 2005 to 2007", *Journal of Travel & Tourism Marketing*, Vol. 26 Nos. 5-6, pp.599-623.

Lee, H.A., Law, R., and Murphy, J. (2011), "Helpful reviewers in TripAdvisor, an online travel community", *Journal of Travel & Tourism Marketing*, Vol. 28 No.7, pp.675-688.

Lo, R. (2019), "5 hi-tech hotels in Asia that use robot concierges and apps to serve guests", available at: https://www.scmp.com/magazines/style/tech-design/article/2185690/5-hi-tech-hotels-asia-use-robot-concierges-and-apps (accessed 9 January 2020)

Lu, J., Mao, Z., Wang, M., and Hu, L. (2015), "Goodbye maps, hello apps? Exploring the influential determinants of travel app adoption", *Current Issues in Tourism*, Vol. 18 No. 11, pp.1059-1079.

Manning, R.A. (2019), "Will AI cripple or leapfrog developing nations' growth?", available at: https://nationalinterest.org/blog/buzz/will-ai-cripple-or-leapfrog-developing-nations-growth-87716 (accessed 21 October 2019)

Marinova, D., de Ruyter, K., Huang, M.H., Meuter, M.L., and Challagalla, G. (2017), "Getting smart: learning from technology-empowered frontline interactions", *Journal of Service Research*, Vol. 20 No. 1, pp.29-42.

Mehran, J. and Olya, H.G. (2019), “Progress on outbound tourism expenditure research: a review”, *Current Issues in Tourism*, Vol. 22 No. 20, pp.2511-2537.

Min, H. (2020), “Pandemic spurs adaptation, upgrades in China’s hotel industry", available at: https://www.shine.cn/biz/tech/2005299121/ (accessed 2 June 2020)

Moyle, B.D., McLennan, C.L.J., Ruhanen, L., and Weiler, B. (2014), “Tracking the concept of sustainability in Australian tourism policy and planning documents”, *Journal of Sustainable Tourism*, Vol. 22 No. 7, pp.1037-1051.

Murison, M. (2016), “Are robots the future of the travel industry?”, available at: https://travelshift.com/robots-travel-industry-future/ (accessed 4 October 2019)

Murphy, J., Gretzel, U., and Pesonen, J. (2019), “Marketing robot services in hospitality and tourism: the role of anthropomorphism”, *Journal of Travel & Tourism Marketing*, Vol. 36 No. 7, pp.784-795.

Murphy, L., Mascardo, G., and Benckendorff, P. (2007), “Exploring word-of-mouth influences on travel decisions: friends and relatives vs. other travellers”, *International Journal of Consumer Studies*, Vol. 31 No.5, pp.517-527.

Murphy, J., Gretzel, U. and Hofacker, C. (2017), “Service robots in hospitality and tourism: investigating anthropomorphism” paper presented in 15th APacCHRIE Conference, Vol. 31, Bali, Indonesia.

Murphy, J., Hofacker, C., and Gretzel, U. (2017), “Dawning of the age of robots in hospitality and tourism: challenges for teaching and research”, *European Journal of Tourism Research*, Vol. 15, pp.104-111.

Nakagawa, S., Akutsu, H., Tsuchiya, Y., Matsuhira, N., and Narita, M. (2016), “Demonstration experiments of a robot service of stamp-rally and questionnaires for tourism destination marketing”, paper presented at the 5th IIAI International Congress on Advanced Applied Informatics (IIAI-AAI), IEEE, Kumamoto, Japan, pp.914-919.

Noone, B.M, and Coulter, R. C. (2012), “Applying modern robotics technologies to demand prediction and production management in the quick-service restaurant sector”, *Cornell Hospitality Quarterly*, Vol. 53 No. 2, pp.122-133.

O'Connor, P. (2010), “Managing a hotel's image on TripAdvisor”, *Journal of Hospitality Marketing & Management*, Vol. 19 No. 7, pp.754-772.

Osawa, H., Ema, A., Hattori, H., Akiya, N., Kanzaki, N., Kubo, A., Tora, K., and Ichise, R. (2017), "Analysis of robot hotel: reconstruction of works with robots", paper presented at the 26th IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN), 2017 26th IEEE International Symposium on, IEEE, Piscataway, NJ, pp.219-223.

Phi, G. T. (2019), “Framing overtourism: a critical news media analysis”, *Current Issues in Tourism*, DOI: 10.1080/13683500.2019.1618249.

Pinillos, R., Marcos, S., Feliz, R., Zalama, E., and Gómez-García-Bermejo, J. (2016), “Long-term assessment of a service robot in a hotel environment”, *Robotics and Autonomous Systems*, Vol. 79, pp.40-57.

Post, V. (2019), “Singapore’s robotic future arrives: robots works as chefs and assists heart surgeons”, available at: https://kr-asia.com/singapores-robotic-future-arrives-robots-works-as-chefs-and-assists-heart-surgeons (accessed 5 October 2019)

Reuter, C., Hughes, A.L., and Kaufhold, M.A. (2018), “Social media in crisis management:

an evaluation and analysis of crisis informatics research", *International Journal of Human–Computer Interaction*, Vol. 34 No.4, pp.280-294.

Rodriguez-Lizundia, E., Marcos, S., Zalama, E., Gómez-García-Bermejo, J., and Gordaliza, A. (2015), "A bellboy robot: study of the effects of robot behaviour on user engagement and comfort", *International Journal of Human–Computer Studies*, Vol. 82, pp.83-95.

Royakkers, L. and van Est, R. (2015), "A literature review on new robotics: automation from love to war", *International Journal of Social Robotics*, Vol. 7 No. 5, pp.549-570.

Scott, N., Zhang, R., Le, D., and Moyle, B. (2019), "A review of eye-tracking research in tourism", *Current Issues in Tourism*, Vol. 22 No.10, pp.1244-1261.

Shi, C., Shiomi, M., Kanda, T., Ishiguro, H., and Hagita, N. (2015), "Measuring communication participation to initiate conversation in human–robot interaction", *International Journal of Social Robotics*, Vol. 7 No. 5, pp.889-910.

Shin, D.H. and Kim, W.Y. (2008), "Applying the technology acceptance model and flow theory to cyworld user behavior: implication of the web 2.0 user acceptance", *CyberPsychology & Behavior*, Vol. 11 No. 3, pp.378-382.

Sigala, M. (2012), "Social networks and customer involvement in new service development (NSD) The case of www.mystarbucksidea.com", *International Journal of Contemporary Hospitality Management*, Vol. 24 No. 7, pp.966-990.

Sigala, M. (2018), "New technologies in tourism: from multi-disciplinary to anti-disciplinary advances and trajectories", *Tourism Management Perspectives*, Vol. 25, pp.151-155.

So, K.K.F., King, C., and Sparks, B. (2014), "Customer engagement with tourism brands: scale development and validation", *Journal of Hospitality & Tourism Research*, Vol. 38 No. 3, pp.304-329.

Spasojevic, B., Lohmann, G., and Scott, N. (2018), "Air transport and tourism–a systematic literature review (2000–2014)", *Current Issues in Tourism*, Vol. 21 No. 9, pp.975-997.

Stock, R.M. (2016), "Emotion transfer from frontline social robots to human customers during service encounters: testing an artificial emotional contagion model", available at: https://aisel.aisnet.org/icis2016/HumanBehavior/Presentations/15/ (accessed 13 January 2020)

Straub, E.T. (2009), "Understanding technology adoption: theory and future directions for informal learning", *Review of Educational Research*, Vol. 79 No. 2, pp.625-649.

Thomas, D.R. (2006), "A general inductive approach for analyzing qualitative evaluation data", *American Journal of Evaluation*, Vol. 27 No. 2, pp.237-246.

Tseng, C., Wu, B., Morrison, A. M., Zhang, J., and Chen, Y. C. (2015), "Travel blogs on China as a destination image formation agent: a qualitative analysis using Leximancer", *Tourism Management*, Vol. 46, pp.347-358.

Tung, V.W.S. and Au, N. (2018), "Exploring customer experiences with robotics in hospitality", *International Journal of Contemporary Hospitality Management*, Vol. 30 No. 7, pp.2680-2697.

Tung, V.W.S. and Law, R. (2017), "The potential for tourism and hospitality experience research in human–robot interactions", *International Journal of Contemporary Hospitality Management*, Vol. 29 No. 10, pp.2498-2513.

Van-Doorn, J., Lemon, K.N., Mittal, V., Nass, S., Pick, D., Pirner, P., and Verhoef, P.C.

(2010), "Customer engagement behavior: theoretical foundations and research directions", *Journal of Service Research*, Vol. 13 No. 3, pp.253-266.

Van-Doorn, J., Mende, M., Noble, S. M., Hulland, J., Ostrom, A. L., Grewal, D., and Petersen, J. A. (2017), "Domo arigato Mr. Roboto: emergence of automated social presence in organizational frontlines and customers' service experiences", *Journal of Service Research*, Vol. 20 No. 1, pp.43-58.

Veal, A.J. (2006), *Research methods for leisure and tourism*, Pearson, London.

Vivek, S.D., Beatty, S.E., Dalela, V., and Morgan, R.M. (2014), "A generalized multidimensional scale for measuring customer engagement", *Journal of Marketing Theory and Practice*, Vol. 22 No. 4, pp.401-420.

Vivek, S.D., Beatty, S.E. and Morgan, R.M. (2012), "Customer engagement: exploring customer relationships beyond purchase", *Journal of Marketing Theory and Practice*, Vol. 20 No. 2, pp.122-146.

Webster, C. and Ivanov, S. (2019), "Future tourism in a robot-based economy: a perspective article", *Tourism Review*, DOI:10.1108/TR-05-2019-0172.

Wen, J., Kozak, M., Yang, S., and Liu, F. (2020a), "COVID-19: potential effects on Chinese citizens' lifestyle and travel", *Tourism Review*, DOI:10.1108/TR-03-2020-0110.

Wen, J., Wang, C.C., and Kozak, M. (2020b), "Post-COVID-19 Chinese domestic tourism market recovery: potential influence of traditional Chinese medicine on tourist behaviour", *Anatolia*, DOI: 10.1080/13032917.2020.1768335.

Werthner, H. and Klein, S. (1999), "ICT and the changing landscape of global tourism distribution", *Electronic Markets*, Vol. 9 No. 4, pp.256-262.

Wirtz, J., Patterson, P. G., Kunz, W. H., Gruber, T., Lu, V. N., Paluch, S., and Martins, A. (2018), "Brave new world: service robots in the frontline", *Journal of Service Management*, Vol. 29 No. 5, pp.907-931.

Wolbring, G. and Yumakulov, S. (2014), "Social robots: views of staff of a disability service organization", *International Journal of Social Robotics*, Vol. 6 No. 3, pp.457-468.

Xiang, Z. and Gretzel, U. (2010), "Role of social media in online travel information search", *Tourism Management*, Vol. 31 No. 2, pp.179-188.

Xiao, L. and Kumar, V. (2019), "Robotics for customer service: a useful complement or an ultimate substitute?", *Journal of Service Research*, DOI:10.1177/1094670519878881.

Ye, Q., Law, R., Gu, B., and Chen, W. (2011), "The influence of user-generated content on traveler behavior: an empirical investigation on the effects of e-word-of-mouth to hotel online bookings", *Computers in Human Behavior*, Vol. 27 No. 2, pp.634-639.

Yim, C. K., Tse, D. K., and Chan, K. W. (2008), "Strengthening customer loyalty through intimacy and passion: roles of customer–firm affection and customer–staff relationships in services", *Journal of Marketing Research*, Vol. 45 No. 6, pp.741-756.

Yu, C. E. (2020), "Humanlike robots as employees in the hotel industry: thematic content analysis of online reviews", *Journal of Hospitality Marketing & Management*, Vol. 29 No. 1, pp.22-38.

Zeng, Z., Chen, P. J., and Lew, A. A. (2020), "From high-touch to high-tech: COVID-19 drives robotics adoption", *Tourism Geographies*, DOI: 10.1080/14616688.2020.1762118.