ABSTRACT

Purpose

The present study investigated the effects of hotel customers' perceived utilitarian and hedonic values on their intention to use service robots. In addition, the influences of innovativeness, ease of use, and compatibility on hotel customers' perceived utilitarian and hedonic values were examined.

Design/methodology/approach

The data of the current study was collected from eleven countries including United States, United Kingdom, Turkey, Spain, Romania, Japan, Israel, India, Greece, Canada, and Brazil. A Structural equation modeling (SEM) was used to test the study hypotheses.

Findings

The results indicated that hotel customers' intention to use service robots were positively influenced by their utilitarian and hedonic value perceptions. In addition, customers' perceptions of robots' ease of use and compatibility had a positive impact on their perceived utilitarian and hedonic values.

Originality/value

The findings of the current study provide unique contributions in the context of hospitality robotics technology adoption literature. In addition, this study provides valuable insights and novel opportunities for hospitality decisionmakers to capitalize on as they strive to strategize the integration of robot-based services into their operations.

Keywords: Service robots, hotel robots, hospitality robots, utilitarian value, hedonic value, ease of use, behavioral intention

1. Introduction

Gaining popularity in the second half of the twentieth century, robots have been utilized in various industries, such as manufacturing, agriculture, transportation, and aviation (Bae & Chung, 2019; Belk, 2017; De Koning & Rodenburg, 2004; Maurer et al., 2016). However, current possibilities and application alternatives that emerged with robotic technologies were unheard of in the not-so-distant past, with service robots now employed in various hospitality settings as a result of the advancements in human-centered robots and artificial intelligence (AI) (Li, 2015; Tung and Law, 2017).

Robots are programmable artificially intelligent machines that are designed to carry out various tasks in a broad range of environments (Scholtz, 2003). In contrast to industrial robots, service robots share the same space with humans, coming in contact with them based on the service agenda and objectives defined by the organizations. Consequently, gauging the customer perspective while determining the most befitting and acceptable service areas and configurations for service robots are of utmost importance for the successful implementation of these new technologies. Therefore, a human-centered approach should be undertaken, augmented by the algorithmic and software-based approach, i.e., engineering-driven strategies (Tung & Law, 2017; Zinn et al., 2004), in order to co-create novel experiences for hotel customers and engender memorable relationships (Tung & Au, 2018).

An increasing number of hospitality organizations are integrating robots into their daily operations to lower their operational costs and to provide superior experiences to their customers in recent years (Belanche et al., 2020). Botlr, Starwood's robotic butler (Cain et al., 2019; Crook, 2014; Witts, 2021); AIRSTAR, Incheon Airport's passenger-aiding robot (Lee, 2018; Shim, 2018); Bionic Bar, Royal Caribbean's Quantum of the Seas' robotic bar (Golden, 2014;

RoyalCarribbean, 2022); Connie, a robot concierge (Bellini & Convert, 2017; Sterling, 2017); Sacarino, an interactive bellboy robot (Lee *et al.*, 2020; Zalama *et al.*, 2014); Pepper, a travel assistant (Mende et al., 2019; SoftBankRobotics, 2021); Theresa, a robotic waitress (McAllister, 2021) ; and Hen-na, a robotic hotel in Japan (Hertzfeld, 2019), are some of the robotic applications in hospitality and tourism settings. These social robots, a synonym for service robots, emerged as a result of the evolving mindset of hospitality and tourism operators, where robots are a part of heterogenous service experience (Dautenhahn and Billard, 1999; Tung and Law, 2017) . The state of AI in 2020 global survey by McKinsey & Company revealed that service-operation and service-development functions were ranked highest in AI adoption by businesses (Balakrishnan et al., 2020).

AI in general, and robotic technologies in particular, have been a popular academic research domain in recent years, given the prediction that robots will continue to exponentially penetrate various industries in the next two decades. Nevertheless, while the hotel customers' perceptions of robots, the impacts of the service robot integration at hotels, customer-robot interaction, and Covid-19 era robotic application in hotels have been previously investigated (Alaiad and Zhou, 2014; Bogue, 2020; Chen et al., 2021; Liu et al., 2022; Zeng et al., 2020), factors affecting hotel customers' behavioral intention toward service robots, especially from the hedonic and utilitarian value perspectives has not been extensively studied. Further, existing studies predominantly assumed a single country approach, failing to provide a comprehensive picture of customers' behavioral intentions from a multi-country perspective.

The hospitality industry has been an avid adopter of new technologies while deploying them in various capacities to generate utilitarian and hedonic values for the hotel customers, as witnessed in the robotic technologies around the globe (**Lee et al., 2021**; Lin et al., 2020; Shin

and Choo, 2011). Hedonic aspect of robots in a hotel environment is important because the hospitality industry, in its essence, is an experience-based industry. Success of the hospitality operations hinges on creating personal, memorable, and unique experiences for the hotel customers (Hemmington, 2007). By the same token, utilitarian aspect of utilizing robots serves as a complementary dimension of the hedonic experience thanks to robots' capacity to converge knowledge and information to support the delivery of services (Lin and Mattila, 2021; Lu et al., 2020). As a conspicuous antecedent to utilitarian and hedonic value of robots, ease of use plays an equally critical role in creating the desired perceptions with the customers. Previous research revealed that perceived ease of use of a technology is positively associated with users' hedonic and utilitarian value perceptions, and when the technology is perceived to be hard to use, customers form a negative perception about the technology despite their underlying beliefs about its usefulness (Rodrigues et al., 2016). In addition, prior literature also demonstrated that an innovation's perceived congruence with customers' existing values, needs, and past experiences and customers' individual differences such as their personal innovativeness level are theoretically crucial in explaining their perceptions toward innovations (Yuan et al., 2022).

Based on the discussion provided above, this study aimed to examine the factors that affect customers' intention to use robots in the hotel industry. More specifically, the current study investigated the impacts of utilitarian and hedonic values on customers' intention to use robots in hotels by assessing customers' perceptions in eleven countries. In addition, the impacts of customers' personal innovativeness, perceived ease of use and perceived compatibility on perceived hedonic and utilitarian values were examined.

Built upon the existing literature and the aforementioned theoretical underpinnings, the current study offers significant theoretical contributions to the body of knowledge in the context

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of technology adoption in general, service robot acceptance in particular in the hotel industry. In addition, this study provides valuable insights and novel opportunities for hospitality decisionmakers to capitalize on as they strive to strategize the integration of robot-based services into their operations.

2. Literature Review

2.1. Utilitarian and hedonic values

With the advancements in information and communications technologies (ICTs) and the advancements in AI and robotics, effective technology implementation has become a determining factor in the success of the hospitality organizations (Olsen & Connolly, 2000). As an experience-centered industry that is founded on creating hedonic and utilitarian values for its customers (Pizam, 2010), hospitality organizations operate with agility to take advantage of these technological advances to create unique possibilities for service enhancement (Ozturk *et al.*, 2016). Applications of robots and robotic technologies that are currently deployed by the pioneering hospitality organizations serve an auxiliary role that is designed to enhance customer experiences by providing functional and hedonic experiences (Choi *et al.*, 2021). Based on Deci's (1976) motivational theory and Deci and Ryan's (1985) self-determination theory, which integrate the concepts of motivation and value, the present study adopted utilitarian and hedonic values as the antecedents in evaluating customers' acceptance of robotic technologies in the hotel industry.

Self-determination theory posits that extrinsic and intrinsic rationale defines the individual conduct, where intrinsic motivation is concerned with actions that are immanently desirable while extrinsic motivation is concerned with the actions that are driven by external rewards (Deci and Ryan, 1985). Subscribing to Deci and Ryan's (1985) self-determination

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theory, Babin *et al.* (1994) resolved that consumers' motivations focalized on the values that benefited them through their consumption behaviors. Bloch and Richins (1983) approached the utilitarian value from a task-oriented perspective, while Bloch and Bruce (1984) defined hedonic value as the consequence of the activity engaged or the experience had.

McGuire (1974) maintained that motives that shaped the consumers' behaviors, cognitive or affective, are determined by distinct motives with gratification and satisfaction at their core. Emphasizing the utilitarian and hedonic motives, Hirschman (1984) advanced that consumer behavior is shaped by individual notions and/or feelings, Accordingly, utilitarian value is characterized by goal and task orientation determined by individual's rational behavior. More specifically, utilitarian value is the individual's broader judgement regarding the practical benefits and sacrifices involved (Overby & Lee, 2006). It refers to the rational and objective aspect of the customer behavior (Batra & Ahtola, 1991). Hedonic value, however, is driven by the individual's proclivity for pleasure and joy, and hence is a manifestation of customers' more personal and subjective behavior (Yang and Lee, 2010). It is driven by pleasure that is attained from the utilization of a service or product (Hirschman & Holbrook, 1982; Ozturk et al., 2016). This hedonic underpinning has been shown to be applicable in the artificially intelligent service agents, such as robots, as well (Chi et al., 2020; Hu, 2021).

The present study proposes a theoretical model that posits robotic technologies in the hospitality industry contain both utilitarian and hedonic values, which positively influence customers' intention to use robots. Furthermore, innovativeness, ease of use, and compatibility have been integrated into the theoretical framework as the antecedents of hotel customers' utilitarian and hedonic values toward using service robots. Given the permanence of these constructs in the technology acceptances models (see Rogers, 1962, 1983; Davis, 1985), the

present study set out to assess their validity as antecedents to hotel customers' utilitarian and

hedonic values in the robotic context.

2.2. Impacts of utilitarian and hedonic value on robotic technology acceptance

A review of the extant literature indicates that customers' increased utilitarian and

hedonic value perceptions lead to positively influenced behavioral intentions, such as intention to

use and/or continued use (Chen et al., 2022; Chiu et al., 2014; Liu et al., 2022; Odekerken-

Schröder et al., 2022; Wu et al., 2021). For example, in a study conducted by Bilgihan and

Bujisic (2015), the authors developed a model of utilitarian and hedonic website features,

customer commitment, trust, and e-loyalty. The findings of the study underlined the significance

of hedonic and utilitarian features in creating loyalty (Bilgihan and Bujisic, 2015). Lee et al.

(2011), investigated differential effects of hedonic and utilitarian robot use motivations in an

experimental study. Further, Miao et al. (2014) analyzed the hedonic dimension of the hospitality

consumption at all three stages, pre-consumption, consumption, and post-consumption, In a

quasi-experimental study. Their results highlighted the dynamism of hospitality consumption

experience's perceived hedonic value (Miao *et al.*, 2014). These findings were further supported

by Guan et al. (2022) in the robot restaurant context.

In the robotic context, Lin *et al.* (2020) explored the antecedents of customers'

willingness and objection to use service robots in full- and limited-service hotel settings. The

findings of their study indicated that hedonic motivation, emotions toward the artificially

intelligent devices, and performance and effort expectancies had an influence on customers'

intention to use robots (Lin *et al.*, 2020). In a similar study, Lee et al. (2021) assessed hotel

customers' inherent perceptions of using robots. The authors surveyed 494 potential users of a

hotel robot assistant and found that performance expectancy, and hedonic motivation were

positively associated with customers' robot-use behaviors (Lee et al., 2021). In a qualitative study, Choi et al. (2021) semantically analyzed 1,498 customer reviews in nine robot-staffed hotels in Japan to compare Japanese and international customers. Their findings indicated that robot-human interactions were one of the main experiential dimensions for the customers, eliciting both emotional and functional responses. Hwang et al. (2021) investigated the role of utilitarian and hedonic values of coffee shop customers on their memorable brand experience, while testing the moderating role of service provider, employee vs. robot. The results of the study confirmed the role of utilitarian and hedonic values as an antecedent of memorable brand experience (Hwang et al., 2021).

Guided by the usability, social acceptance, user experience, and societal impact (USUS) framework (Weiss et al., 2009), Tung and Au (2018) explored customer experiences in four hotels that employed service robots by analyzing customer-generated reviews on social media. While some reviews pointed to both positive and negative emotions experienced by the customers based on their interactions with the robots, some emphasized the utilitarian value of the robots particularly in circumstances where the robots were mitigating the lack of certain hotel amenity. Further, Lin and Mattila (2021) utilized a mixed-method design to investigate the perceived value of service robots from the customer perspective and found that functional benefits of the robots were one of the attributes that had a positive impact on customers' overall experience.

Previous studies that explored the relationship between the customers' hedonic and utilitarian values and their intentions to use artificial intelligent technologies, such as service robots, relied on the customer perspectives collected from a single country. Although these studies provided valuable insights, they were limited in their scope. To address this limitation,

the present study investigated this relationship by assuming a global perspective through data collection in eleven countries. As a result, a more comprehensive and insightful perspective on the phenomenon of interest, i.e., the impacts of hotel customers' hedonic and utilitarian values on their intentions to use service robots, has been attained by the current study. Against this background, we propose the following hypotheses:

> **H1:** *Hotel customers' perceived utilitarian value positively influences their intention to use service robots*
>
> **H2:** *Hotel customers' perceived hedonic value positively influences their intention to use service robots.*

2.3. Factors affecting utilitarian and hedonic value of using robots in the hotel industry

2.3.1. Innovativeness

Consumer innovativeness has been a significant force in the diffusion of innovation studies and led to the creation of a rich literature base (Arts et al., 2011; Flynn & Goldsmith, 1993; Hung, 2020; Im et al., 2003; Roehrich, 2004; San Martín & Herrero, 2012). Cotte (2004) defined individual innovativeness as the tendency to embrace change and explore new behaviors or products. Innovativeness, however, was well-researched and established by prior studies based on the innovation diffusion theory (Rogers, 1983, 1995) and marketing (Flynn & Goldsmith, 1993; Midgley & Dowling, 1978). From a practical perspective, innovativeness refers to the individual trait of early adopters when a new technology is first introduced. These early adopters also serve as critical change agents in propagating the acceptance of the new technology even further (Rogers, 1995) Agarwal and Prasad (1998) studied personal innovativeness in the technology acceptance setting (i.e., Personal Innovativeness in Information Technology – PIIT) and defined it as the willingness of individuals to try out new technologies.

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The positive impact of innovativeness on technology adoption in the context of hospitality industry has been confirmed by various studies. Ozturk et al., (2016), for example, tested a theory-based model to investigate the antecedents of consumers' usage intentions in the mobile hotel booking context. The study findings revealed that consumers' innovativeness significantly influenced their utilitarian and hedonic values (Ozturk et al., 2016). In the robotic context, Hung (2020) analyzed 276 surveys from Taiwanese medical robot users to explore the factors that effected the use of these robots. The author found that innovativeness had a positive impact on users' attitude towards robots (Hung, 2020). Kim *et al.* (2021) studied the impact of restaurant customer innovativeness on their intention to use service robots and found that innovativeness was positively associated with customers' intention use the robots. In the hotel context, Lee et al. (2021) explored the underpinnings of customers' behavioral intentions to use robots. The findings of their study indicated that innovativeness was one of the factors that influenced customers' robot-using behavior (Lee et al., 2021).

Accordingly, in the present study, innovativeness is hypothesized to have a positive influence on hotel customers' utilitarian and hedonic value perceptions. Comparing the service robots with traditional self-service technologies, Kuntz et al. (2022) proposed a service robot deployment model (SRD model) by highlighting the human-robot collaboration. Authors also advanced a set of drivers to customers' acceptance of service robots in the pre-service encounter stage (Kuntz et al., 2022). In a similar vein, the present study hypothesizes innovativeness as an antecedent of hotel customers' utilitarian and hedonic value perceptions, which positively influence their intentions to use service robots. Hence,

>*H3: Hotel customers' innovativeness positively influences their perceived utilitarian*
>
>*value of service robots.*

H4: *Hotel customers' innovativeness positively influences their perceived hedonic value of service robots.*

2.3.2. Ease of use

Introduced by the technology acceptance model (TAM; Davis, 1985) as one of the two main factors in consumer's acceptance of a new technology, ease of use is the belief that postulates users' perceptions regarding the level of effort a new technology will require will form their behavioral intention. Thus, it is the user's belief that the technology presented will not require too much of a mental and/or physical effort to use or operate, and, as a result, his or her behavioral intention toward an application or technology will be formed accordingly (Davis, 1989; Venkatesh & Davis, 1996). The role of ease of use has received considerable amount of scholarly attention as a driver of technology adoption in previous studies (Adams et al., 1992; Gefen & Keil, 1998; Subramanian, 1994; Venkatesh, 2000) and has been extensively studied and well-documented as a technology acceptance construct (Bagozzi, 2007; Devaraj et al., 2008; Dishaw & Strong, 1999; Lee et al., 2003; Lu et al., 2019; Özbek et al., 2014; Venkatesh, 2000; Venkatesh & Davis, 2000).

A considerable body of hospitality literature also exists on ease of use as a technology acceptance construct (Kim *et al.*, 2008; Lam *et al.*, 2007; Ozturk, 2016). Kucukusta et al. (2015), for example, explored what kind of a role the ease of use played in online users' intention to book a hotel room in Hong Kong while gauging the user demographics and their internet usage characteristics. The authors reported that ease of use aspect was of great significance for jobseekers, students, and employees. Wendy Zhu and Morosan (2014) investigated how hotel customers developed attitudes and intentions to use interactive mobile technologies (MIT) while assessing how their perceived ease of use of MIT influenced their attitudes toward these

technologies in a hotel environment. The findings of the study indicated that ease of use had a

positive effect on customers adoption behavior (Wendy Zhu & Morosan, 2014).

In the robotic context, Park and del Pobil (2013) adopted TAM to evaluate the

relationship between the users' perceived ease of use of the service robots and their attitudes

towards using them. The findings indicated that ease of use had a significant impact on users'

attitude (Park & del Pobil, 2013). In a more recent study, de Kervenoael *et al.* (2020) analyzed

Singapore's hospitality industry deploying a mixed-method approach to analyze the drivers of

visitors' intentions to use social robots in hospitality settings. The authors reported that ease of

use significantly influenced customers' perceived value of service robots (de Kervenoael *et al.*,

2020). In accordance with the aforementioned study by Kuntz et al. (2022), the present study

hypothesizes ease of use as a design and functionality dimension of service robots at the

encounter level, preceding hotel customers' utilitarian and hedonic value perceptions. Based on

these theoretical underpinnings, the following hypotheses were deployed:

> **H5:** *Hotel customers' perceived ease of use positively influences their perceived*
>
> *utilitarian value of service robots.*
>
> **H6:** *Hotel customers' perceived ease of use positively influences their perceived hedonic*
>
> *value of service robots.*

2.3.3. Compatibility

Presented as one of the five characteristics in diffusion of innovation theory, Rogers

(1983) described compatibility as the innovation's perceived agreement with the existing values,

needs, and prior experiences of the potential adopters. Approaching the construct from a

technology task fit perspective, Goodhue (1995) emphasized the significance of a new

technology's compatibility with consumers' prior technology-related experiences and its

consistence with their existing sociocultural values and beliefs. Ozturk *et al.* (2016) empirically tested a research model that investigated hotel customers' mobile hotel booking loyalty by examining data collected from 396 mobile hotel bookers. The results of the study indicated that compatibility had a significant impact on customers' behavioral intentions pertinent to mobile hotel booking technologies (Ozturk *et al.*, 2016). In a study that utilized data from 312 hotel customers, Han et al. (2021) proposed a technology acceptance framework to assess customers' acceptance behavior toward the experience-enhancement smart technologies, emphasizing the long-term implications of integrated smart technologies in the hospitality context. The findings of their study reinforced the validity of compatibility construct in understanding customers' intention to use behavior with smart-technology-enhanced hospitality experiences (Han *et al.*, 2021).

Adopting the valence theory, Ozturk *et al.* (2017) studied the factors effecting restaurant customers' intention to use near-field-communication (NFC)-based mobile payment technology. The findings of the study revealed that customers' perceptions of the compatibility of the technology positively influenced their utilitarian values (Ozturk *et al.*, 2017). In the AI context, Yuan *et al.* (2022) explored consumers' willingness to accept AI assistants, while assessing compatibility's impact on utilitarian and hedonic values and found that compatibility had a significant positive impact on both utilitarian and hedonic values. In the HRI context, Jang et al. (2016) collected data through interviews to conceptually explain the experience quality and the judgement criteria. The results of their study provided substantial evidence for the link between the users' utilitarian goals and the compatibility of the technology (Jang *et al.*, 2016). It is, however, worth noting that decomposing the adoption of robotic technologies and customers' behavioral intentions with artificially intelligent technologies with deep-learning capabilities

presents a complex and multidimensional challenge for the hospitality decisionmakers and,

therefore, requires further examination (Buhalis, 2020). To aid with this process, the present

study takes the additional step of exploring compatibility by gauging its influence on customers'

hedonic and utilitarian value perceptions. Further, by assessing the compatibility of service

robots as an antecedent of hotel customers' utilitarian and hedonic value perceptions, this study

responds to Kuntz et al.'s (2022) call to evaluate robot designs and functions for different service

settings at the encounter stage. Therefore, the following hypotheses were proposed:

> **H7:** *Hotel customers' perceived compatibility positively influences their perceived*
>
> *utilitarian value of service robots.*
>
> **H8:** *Hotel customers' perceived compatibility positively influences their perceived*
>
> *hedonic value of service robots.*

The research model below illustrates the study hypotheses (Figure 1).

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3. Methodology

3.1. Instrument

The survey consisted of three sections. The first section included a definition of robot

and an explanation of robotics technologies in the hotel industry with examples. This section also

included a screening question (i.e., have you stayed in a hotel in the last 12 months). The second

section of the questionnaire included questions related to study variables. Finally, the last section

of the survey gathered information regarding the respondents' demographic characteristics

including gender, age, education, income, and marital status.

The measurement scales for all constructs in the current study were adopted from prior

studies. To measure innovativeness, a 3-item scale was adapted from Agarwal and Prasad.

(1998). Ease of use was measured with a scale including three items from Davis (1989). A 3-item scale from Moore and Benbasat (1991) were adopted to measure compatibility. Perceived hedonic value and perceived utilitarian value were measured by using a 3-item scale from Babin *et al.* (1994). Finally, a 3-item scale from Davis *et al.* (1992) was adapted to measure intention to use. All constructs were measured by using a seven-point Likert scale (i.e., 1 = strongly disagree to 7 = strongly agree).

The data of the current study was collected from eleven countries including United States, United Kingdom, Turkey, Spain, Romania, Japan, Israel, India, Greece, Canada, and Brazil. For Japan and Spain, the surveys were translated from English to Japanese and Spanish languages by using a back-translation method. The method included three steps. First, two of the authors who were expert in both languages translated the original English surveys into Japanese and Spanish languages. Second, the Japanese and Spanish surveys were back translated into English by the same authors. Finally, the surveys were cross-checked by two scholars to confirm the translation were accurate with the original English survey.

For the other countries, the surveys were distributed via local marketing companies in English. To ensure the clarity and comprehensiveness of the survey, a pilot test with industry experts and faculty members was conducted. Based on their comments, some wording modifications were made for the survey to reflect the robotics context.

3.2. Data collection and data analysis

The target population of the current study was hotel guests. An online survey was used to collect data from abovementioned countries. To ensure that participants have a clear understanding of robotic technologies in the hotel industry, the beginning of the survey included a definition of robotics technology in general, and implications and examples of service robots in

the hotel industry. Qualtrics, a market research company, was used to collect data from Turkey, United States, Canada, and Spain. For the rest of countries (i.e., Greece, United Kingdom, Romania, India, Israel, Brazil, and Japan), data was collected through local marketing companies.

A screening question (i.e., have you stayed in a hotel in the last 12 months) was asked to ensure the data was collected from the target population. Initially, a total of 1545 surveys were collected. After cleaning the data 1522 surveys were utilized for the data analyses (US N=105, Canada N=150, Israel N=238, Brazil N=127, Spain N=112, Japan N=301, Greece N =128, India N=52, Turkey N =107, UK N=101, Romania N=101).

Among the total of 1522 participants, 43.4% was male and 46.2% was female. The majority of the participants were between the ages of 18 and 55. In terms of education level, 27.9% of participants earned a bachelor's degree and 21% of participants earned a master's degree. More than one third of the participants had above average income. Regarding the marital status, around 34% of participants were never married and 29.7% of participants were married. (Table 1).

Please insert Table 1 here

The current study utilized a two-step approach suggested by Anderson and Gerbing (1988) for the data analyses. The first step involved conducting a confirmatory factor analysis (CFA) with a series of fit indices (i.e., chi square to degrees of freedom ratio, RMSEA, GFI, NFI, IFI, CFI and RFI) that allow the researchers to assess the model fit for the measurement model. In the second step, a structural equation modeling (SEM) was utilized to test the proposed hypotheses.

4. Results

4.1. Measurement model

Prior to proceeding to SEM, it was vital to conduct a CFA assessing the overall fit of the measurement model. A series of indices proposed by Hair *et al.* (1998) were adapted to assess the measurement model and confirm the validity of the scales. The results indicated that the ratio of chi-square value to degree of freedom was less than the recommended value of 3 ($\chi2$ =314.738, df=113; $\chi2$/df =2.785) (Marsh and Hocevar, 1985). Other crucial indicators including NFI (.986), TLI (.988), CFI (.991), IFI (.991), RFI (.982), and RMSEA (.035) were calculated, and the results indicated an acceptable model fit (Hair *et al.*, 1998). The measurement scales' reliability was assessed by Cronbach's alpha and composite reliability (CR). The α coefficients of all constructs were between 0.82 and 0.91, and the CR values were all above 0.7, which indicated the scales used in current study were reliable (Nunnally, 1970). Average variance extracted (AVE) values were used to assess the convergent validity. The AVE values ranged from 0.66 to 0.83, which were higher than the proposed 0.50 cutoff value (Hair *et al.*, 2010), indicating the measurements had convergent validity (Table 2).

Please insert Table 2 here

In addition, the squared root of AVEs were compared with correlations between constructs to determine the discriminant validity (Fornell and Larcker, 1981). The results revealed that the correlations between each construct was less than the squared root of AVE values, indicating that the discriminant validity was confirmed (Table 3).

Please insert Table 3 here

4.2. Structural model analysis

The same series of indices were used to assess the goodness-of-fit of the overall structural model ($\chi 2$= 361.185, df = 113; $\chi 2$/df =3.114, NFI = .984, CFI = .989, TLI = .986, RFI = .979, IFI = .989; RMSEA = .038). The results of the above fit indices for the final model indicated an acceptable structural model fit. The results demonstrated that except H3 and H4, rest of the hypotheses were supported. More specifically, the study results indicated that hedonic and utilitarian value had a positive impact on intention to use and ease of use and compatibility positively influenced hedonic and utilitarian value. The study results further revealed that innovativeness was not associated with hedonic and utilitarian value. Moreover, the variance explained was 68% for hedonic value, 86% for utilitarian value, and 61% for intention to use. Figure 2 and Table 4 provide the results of hypotheses testing with path coefficients.

Please insert Table 4 here

Please insert Figure 2 here

5. Discussion and conclusions

5.1. Conclusion

This study was designed to critically assess the factors that affect customers' intention to use robotic technologies in the hospitality setting. Given the utilitarian and hedonic foundations of the hospitality industry (Olsen & Connolly, 2000), the present study utilized utilitarian and hedonic values as the determinants of hotel customers' intention to use robots. Furthermore, the current study incorporated hotel customers' level of innovativeness and their perceptions of robots' ease of use and compatibility as the antecedents of utilitarian and hedonic values.

The results of the present study revealed that utilitarian and hedonic values were positively associated with hotel customers' intention to use service robots in hotels. These results

confirmed Deci and Ryan's (1985) proposition, the self-determination theory, which postulated that individual conduct was driven by intrinsic and extrinsic motivations. The results were also consistent with prior literature (Lin *et al.*, 2020), suggesting that when hotel customers value the utilitarian and the hedonic aspects of service robots, they are more likely to use these novel technologies. Furthermore, the study results demonstrated that utilitarian value's impact (path coefficient = 0.63) on hotel customers' intention to use robots was stronger than the hedonic value (path coefficient = 0.21). This finding suggested that hotel customers valued service robots' utilitarian aspects more than hedonic aspects regarding their usage intentions toward service robots.

The study results indicated that the perceived ease of use and perceived compatibility positively influenced hotel customers' perceived utilitarian and hedonic value perceptions toward service robots. In accordance with prior studies (Park & del Pobil, 2013; Wendy Zhu & Morosan, 2014), these results suggested that hotel customers expect that their interactions with the service robots should be clear and understandable. Further, the findings revealed the hotel customers' belief regarding the level of simplicity they expect to experience as they become skillful at using robotic technologies. The same could be said concerning the fit hotel customers perceive between their lifestyles and using these technologies, similar to the way they expect them to be compatible with their needs (Moore & Benbasat, 1991).

The relationship between innovativeness and utilitarian and hedonic values, however, was not supported by the study findings. These findings contradicted the findings of prior studies in the context of technology acceptance (Fauzi & Sheng, 2021; Noh et al., 2014; Ozturk, Nusair, et al., 2016). One possible explanation for this insignificant relationship could be hotel customers' reluctance to experiment with robotic technologies. Another reason could be the

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customers' disinclination to explore these technologies before their friends or peers (Agarwal & Prasad, 1998).

5.2. Theoretical implications

The current study findings provide several important theoretical contributions in the context of hospitality robotics technology adoption literature. Prior studies have examined the antecedents of hospitality service robots' acceptance by focusing on topics related to consumers' perception of service robots, human-robot interaction, and robotic applications in hotels (Bogue, 2020; Chen *et al.*, 2021; de Kervenoael *et al.*, 2020; van Doorn *et al.*, 2016; Wang and Wang, 2021). These studies have primarily focused on motivation to implement service robots or use intentions in general (e.g., Lu *et al.*, 2019; Lin *et al.*, 2020; Yoganathan *et al.*, 2021) and customers' expected interaction experience with service robots (e.g., Lin and Mattila, 2021). Prior studies have also investigated service robot adoption specifically from hedonic and utilitarian value perspectives (Lin et al., 2020; Lee et al., 2021; Hwang et al., 2021). Even though these studies offered significant contributions, they are limited in their scope since they primarily collected data from a single country. By adopting a global perspective and utilizing data collected from eleven countries, the current study results provide a more thorough understanding of factors affecting hotel customers' intentions to use service robots.

This study found that there was a clear difference between customers' perceived utilitarian and hedonic value of service robots, and the study results demonstrated that both hedonic and utilitarian value dimensions were the critical determinants that significantly influenced hotel customers' intention to use service robots.

While AI technologies in general, and robotic technologies in particular, have started to attract great attention of the hotel operators and hotel guests, the question "why guests want to

use and interact with robots in hotels?" remains under-researched. Therefore, it is necessary to integrate different theories to provide a comprehensive understanding of factors affecting customers' behavioral intentions toward this technology. Based on self-determination theory (Deci and Ryan, 1985), and technology acceptance model (Davis, 1989) the current study not only examined the impacts of hedonic and utilitarian value perceptions of hotel guests toward their intention to use service robots in hotels, but also investigated factors affecting their hedonic and utilitarian value perceptions toward this novel technology. The study results indicated that perceived ease of use and compatibility were positively associated with hotel guests' both hedonic and utilitarian value perceptions of service robots, which in turn positively influenced their intention to use. In this regard, the study findings deliver important theoretical contributions to the body of literature by providing comprehensive insights regarding antecedents of hotel guests' behavioral intention toward service robot use.

5.3. Practical implications

Beyond its theoretical contributions, the present research offers several valuable practical implications not only for hospitality technology vendors but also for hotel operators. First, the findings illustrated that it is not only the hedonic value, but also the utilitarian value motivates hotel guests to use service robots. These findings suggested that hotel guests could have an enjoyable and entertaining experience with service robots while taking advantages of robots' distinctive functions allowing them to retrieve information in a convenient and efficient manner. Therefore, service robots should be designed in a way to enhance both utilitarian performance and the hedonic aspects of hotel guests' using experience. For example, hotel service robots could be designed to mimic human facial expressions and include emojis within cartoon outlets to provide an attractive, fun, and entertaining experience. In addition, along with enhanced

hedonic performance of service robots, hotel check-in and check-out processes could be more joyful and less boring. Furthermore, service robots could interact with hotel guests in an entertaining way (i.e., telling jokes and random fun facts, taking selfies etc.) while they are waiting to be checked-in or checked-out. Furthermore, service robots should be able to communicate in several widely spoken languages with face recognition and voice command capabilities to enhance the utilitarian value perceptions of hotel guests.

Second, the results of current study demonstrated that hotel guests' hedonic and utilitarian value perceptions could be increased by improving the ease of use of service robots. In this regard, service robots should be easy to operate, and should quickly and accurately respond to guests commends by facilitating fast information communication. In other words, the functionality of service robots should be in line with its task requirements that allows hotel guests to retrieve and input information efficiently and effortlessly. For example, integrating with other supporting technologies such as voice command and speech recognition, guests should be able to request information about the nearby restaurants or shuttle schedule by simply talking with the robots. Built in help options should also be integrated within the service robots when guests confuse and need help on how to operate or interact with them.

Finally, the study findings demonstrated that when hotel guests believe that service robots are compatible with their needs, fits well with their lifestyles and fits well with the way they like to manage their hotel related services, then they are more likely to use this technology in hotels. Therefore, it is crucial for hotel operators to make sure that the service robots fit well with their guests' segments. For instance, hotel operators, who mainly have business travelers can utilize service robots as conference assistants where robots can help attendees for registration, printing name tags, providing information about the conference schedule and

companing guests to the conference rooms. Service robots can also be utilized to assist transient travelers by providing latest flight information with preferred languages while they accommodate in their hotel waiting for their next flight.

5.4. Limitations and future research

Even though the current study offers several important implications, there are some limitations that should be considered by future research. First, the results of current study may not be generalized to the entire hospitality industry all over the world due to the selected group of countries and convenience sample method used for each country. Future research collecting data from more countries would provide more generalizable results.

Second, the proposed theoretical model of current study adopted innovativeness, ease of use, and compatibility as the antecedents of hotel guests perceived hedonic and utilitarian value. In addition to these crucial factors, other factors (e.g., perceived risk and subjective norm) may also contribute to guests perceived hedonic and utilitarian value of service robots. For instance, guests may use service robots in a hotel just because other guests use it. Therefore, future research should consider other additional factors to enhance the comprehensiveness of the research model.

Third, because robotic technologies have been gradually adapted in hotels, some guests may already have prior experience with service robots. It is worth noting that perceived hedonic and utilitarian values toward service robots may be different for experienced and first-time users (Yu, 2020). Therefore, it would be interesting for future studies to explore hotel guests perceived hedonic and utilitarian value of service robots based on their prior experience.

Finally, hotel guests' service robot perceptions and their behavioral intentions may also differ based on other factors such as service robot types and users' cultural differences. For

example, some hotel guests may find greeting robots more entertaining than robots used for the check-in process in hotels. In this regard, future research, which investigates the impacts of service robot types and users' cultural backgrounds on service robot adoption by utilizing other types of research settings (e.g., longitudinal experimental research design) may provide experience-based insights.

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