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ABSTRACT

This research primarily examines the customer perspective in service innovation in the context of hotel co-creation. Further, present research proposes an extended basic model of technology adoption i.e. technology-based service (TBS) by analysing the impact of customer involvement, need for interaction and degree of co-creation on adoption intention between the hotel guests with the use of smart phone apps. The consequent effect of degree of co-creation on customer satisfaction is also examined. In this study, data were collected from 230 respondents, who were hotel guests in India. Survey method was used to obtain data. Data analysis was done with structure equation modelling (SEM). We find that consumer innovativeness positively and significantly has an effect on customer involvement. The results further reveal that among all antecedents of adoption intention (customer involvement, degree of co-creation and need for interaction), degree of co-creation bears the strongest influence on it and significantly affects customer satisfaction. Additionally, this study found that the degree of co-creation acts as a partial mediator between customer innovativeness and its two outcomes (adoption intention and customer satisfaction). The results will guide hotel managers about the technology adoption for customer co-creative innovation in hotel services.

1. Introduction

The societal practices have undergone a radical transformation with the society becoming more networked through the use of mobile telephones, and its impact can be more realized in the domain of travel and tourism (Dickinson et al., 2014). In this context, to facilitate its future competitiveness, the travel and tourism industry is facing growing demands to innovate worldwide (Cooper & Wahab, 2005; Hall & Ram, 2018; Santos-Vijande, López-Sánchez, & Pascual-Fernández, 2018). Thus, innovation plays a vital role in the context of tourism studies (Narduzzo & Volo, 2018). With rising penetration of smart phones and smart phone apps, it has become easier for users to participate in co-creation of service innovation and personalizing their service experience (Morosan & DeFranco, 2016). As the number of users is growing, smart phone apps are gradually influencing entire service sector including the tourism and travel-related services (Wang & Wang, 2010). The ubiquitous feature of smartphones facilitates individual to exchange location-based social information and this in turn has converted it into a powerful device for travellers and tourists (Dickinson et al., 2014). However, a few smartphone apps are especially designed for tourism and hospitality sector (Dickinson et al., 2014). While recognizing the role of smartphone apps on all forms of tourism travel arrangements,

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the concentration of this study is to understand the influence of consumers' characteristics on degree of co-creation, which in turn has impact on hotels guests' adoption intentions and their satisfaction with new developed services based on co-creative efforts in India via apps of smart phone.

Customers significantly can participate with their resources in newly developed services (Kamboj et al. (2018); Hoyer, Chandy, Dorotic, Krafft, & Singh, 2010; Kamboj, Sarmah, Gupta, & Dwivedi, 2018). Bhattacharya and Sen (2003), Jiménez-Zarco, Martínez-Ruiz, and Izquierdo-Yusta (2011) and Von Hippel (2001) argued that co-creation of customers in innovative service processes improves the efficacy and efficiency of the innovation process. That is why the firms are looking for increased degree of co-creation among customers and service providers, and ensures customers' easy participation through specially designed user toolkits (Kamboj & Rahman, 2016, 2017b; Von Hippel, 2001). Rayna and Striukova (2009, p. 361) commented that, 'As in any other sector, innovation in the hotel industry ranges from incremental innovation to disruptive innovation, which has an impact not only on the hotel, but on the whole sector as well.' Despite impressive growth and importance attached to the sector, there is lack of study in the tourism and hospitality industry regarding co-creation in service innovation in M-commerce space (Morosan, 2015; Morosan & DeFranco, 2016). Past studies in the service innovation literature (Alam, 2006) and with increased popularity of the Service-Dominant Logic (S-DL) (Ngo & O' Cass, 2013), concern is more on harnessing customers' knowledge and skills to develop and improve the new service performance. New service co-creation has been defined as 'a collaborative activity in developing innovations in which the end-customers (or the business clients) actively participate in the process by providing and selecting different attributes of the new market offer' (Hoyer et al., 2010, p. 288).

Although innovation concepts have gradually penetrated into the tourism and hospitality literature (Rodríguez, Williams, & Hall, 2014), study on co-created service innovation in hotels using smart phone apps has been limited (Morosan, 2015; Morosan & DeFranco, 2016). The available literature on co-creation in hospitality services is either conceptual in nature (Neuhofer, Buhalis, & Ladkin, 2014) or case study-based (Shaw, Bailey, & Williams, 2011). There is hardly any insight into the use of M-commerce (Morosan, 2015). This research deficiency caused a number of scholars to call for more studies that are empirical in order to explore the precursors and behavioural consequences of co-creation in technology-based co-creation in service environment (Fuller, Matzler, Hutter, & Hautz, 2012; Heidenreich & Handrich, 2015; Morosan, 2015).

Co-creation in service innovation literature is available in almost in all the industries including the financial services (Alam, 2006; 2012; Chien, He, Tsai, & Hsueh, 2010), information technology (Blazevic & Lievens, 2008), hospitality (Victorino, Verma, Plaschka, & Dev, 2005), manufacturing (Joshi & Sharma, 2004) and educational industry (Verleye, 2015). However, customer co-creation has been discussed in the context of new service adoption intention in the information technology industry (Chen, Tsou, & Ching, 2011), or in service firms functioning in different industries (Kamboj, Yadav, Rahman, & Goyal, 2016; Melton & Hartline, 2010, 2013; Ngo & O' Cass, 2013; Yadav, Kamboj, & Rahman, 2016). Regardless of this, an empirical study on the topic customer co-creation particularly in the hotel industry is very limited (Chathoth, Altinay, Harrington, Okumus, & Chan, 2013a; Morosan & DeFranco, 2016; Navarro, Andreu, & Cervera, 2014). Recently, various researches have investigated the concept of co-creation in travel and tourism context (Campos, Mendes, Valle, & Scott, 2018) from both theoretical (Campos et al., 2018) and empirical perspective (Blazquez-Resino, Molina, & Esteban-Talaya, 2015; Gössling, Haglund, Kallgren, Revahl, & Hultman, 2009; Pera, 2017). However, co-creation from customer perspective in service innovation is studied scantily, specifically in the context of hospitality (Randhawa, Kim, & Cichy, 2017). The present paper tries to cover this research gap via a look into the antecedent factors that result in the degree of co-creation and further help in creating customers' adoption intention and satisfaction via smart phone apps.

Customer adoption intention towards newly developed services (Hoyer et al., 2010) has been discussed as an outcome of co-creation in technology–based services development literature. Towards this, Heidenreich and Handrich (2015) proposed the technology-based services (TBS) adoption model to study the customer willingness effect on personal disparities and innovation attributes to predict

consumers' adoption of TBS. However, this field of study is also constrained with limited numbers that look at the effect of different variables on the adoption behaviour of customers, causing a major research gap in existing literature.

Drawing on all these observations, the present study aims to examine the influence of customer co-creation on the new service adoption intention in the hotels. Furthermore, this study aims to propose an extended innovative TBS adoption model for investigating customers' adoption intention towards new service that are co-created with the hotel guests. The proposed extended TBS adoption model is discussed with three newly added constructs (degree of co-creation, need for interaction and customer satisfaction) to help out the hotel managers in formulating and executing useful policies as good and quick service development facilitates intention to adopt newly developed services among hotel guests.

The subsequent sections of this article is presented in this way: initially, the relevant literature is described, followed by the proposal of hypotheses and a conceptual framework to measure customers' intentions to adopt technology-based new services. Consequently, application of the methodology is discussed along with the analysis of data. Finally, the research findings are presented with significant contributions, limitations and further research avenues.

2. Theoretical background and development of hypotheses

Heidenreich and Handrich (2015) proposed the basic TBS model with the following key constructs: degree of co-creation, adoption intention, personal disparities and innovation attributes. Furthermore, we have extended basic 'TBS model' with consumer innovativeness, need for interaction, involvement and satisfaction (Figure 1). Thus, this study proposes an extended basic 'technology based service (TBS) adoption model' by analysing the impact of customer involvement, need for interaction and degree of co-creation on intentions to adopt service innovations among hotel guests with the use of smart phone apps. The consequent influence of degree of co-creation on customer satisfaction is also examined.

To gain useful insights about the adoption of newly developed services in hotels, this research presents a conceptual model (as depicted in Figure 1) and formulated a few research hypotheses based on extant literature. In the conceptual model, four factors as customer characteristics are considered as precursors of customers' intention to adopt newly developed services. As already defined in the previous part of the paper, the variables consumer innovativeness (INNO) and degree of co-creation (CC) are basic to the extended adoption model (Heidenreich & Handrich, 2015; Sarmah et al., 2017). However, the other constructs customer involvement (INV), customer satisfaction (SAT) and need for
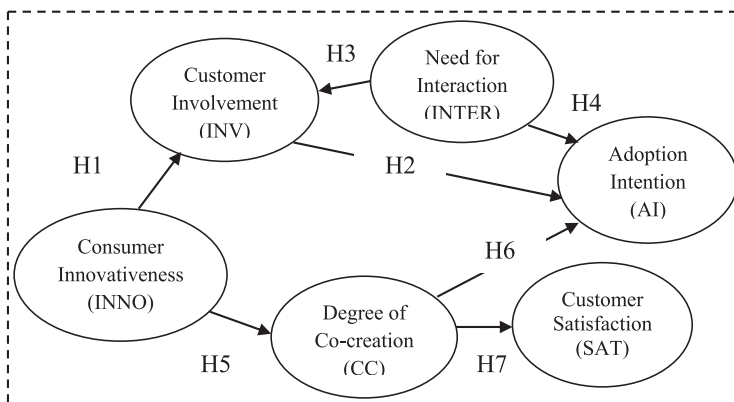
Figure 1. Conceptual model and hypotheses.

interaction (INTER) are proposed in conceptual model as an antecedents of adoption intention to extend the basic TBS model.

The concept 'co-creation' can be discussed from the 'service-dominant logic' (SDL) conceptual lens. In SDL, interaction is considered as the basic elements of service value creation (Prahalad & Ramaswamy, 2004) in which consumers are all the time value co-creators, as they create value-in use for themselves in the process of interaction through learning, resulting in service innovation (Blazquez-Resino et al., 2015; Gouillart, 2014). Recent conceptualization of the Service-Dominant Logic i.e. SDL (Skålén, Gummerus, von Koskull, & Magnusson, 2014; Vargo & Lusch, 2004, 2008) put more emphasis on utilizing customers' operant resources (skills and knowledge) in service innovation. Co-creation has been defined as 'a collaborative activity in developing innovations in which the end-customers (or the business clients) actively participate in the process by providing and selecting different attributes of the new market offerings' (Ngo & O' Cass, 2013; O'hern & Rindfleisch, 2010) that results in customer purchase intentions and repurchase (Dong, Evans, & Zou, 2008). Recently, various companies have established new ways to engage their customers in service innovation process via 'user toolkits', which may grant freedom to the customers so as to create and develop customized product or service for their own (Von Hippel, 1986).

The service-providing firms are using mobile (M-) commerce as an innovative platform to reach the customers. The growing use of mobile technology (smart phone apps) and its related business network is generically called as M-commerce (Sarmah et al., 2017). The mobile apps are powered by features like ubiquity, convenience, personalization and portability (Wang & Wang, 2010). These features of mobile apps reveal fundamental means that support the creation of value in a unique manner. Such unique mechanism was grounded in SDL that becomes a significant approach to understand the creation of value in marketing theory. Thus, technology such as smart phone apps further facilitates engagement of users in service setting (Kleijnen, 2007).

2.1. Consumer innovativeness and customer involvement

An innovative consumer plays an important role towards new service diffusion and adoption (Im, Bayus, & Mason, 2003). Research on consumer innovators is based on their intrinsic innovativeness, which is viewed as an application of a generalized predisposition across product classes (Midgley & Dowling, 1978). The other stream of research has highlighted consumers' instinctive innovativeness as 'a generalized unobservable predisposition toward innovations applicable across product classes' (Kamboj & Rahman, 2017b ; Sarmah et al., 2017), which has been used to identify individuals' innovative characteristics (Kristensson, Gustafsson, & Archer, 2004). Again, consumer innovativeness is viewed as 'a personal characteristic of the extent of accepting novelty' (Midgley & Dowling, 1978) and considered as a predictor of intention to adopt new services. In previous literature, innovativeness has been applied to segment the customer based on their degree of innovativeness versus consumers who do not innovate (Agarwal & Prasad, 1998; Alam, 2006). In comparison to the non-innovative consumers, innovative consumers show more tendencies to adopt firms' offerings (Walczuch, Lemmink, & Streukens, 2007). Today, customers with advanced smart phone apps display more interest to interact with hotel staffs and employees that further helps them to co-create new services with them. Therefore, the authors posit that:

> H1. Consumer innovativeness is associated with their involvement in the hotel service innovation via smart phone apps.

2.2. Customer involvement and adoption intention

The hospitality and tourism industry has witnessed changes due to increased importance of tourists' involvement, supported by technology (Neuhofer et al., 2014). Technology has turned into an important part of hospitality and tourism industry and has transformed it (Buhalis, 2003). The involvement

of customers in newly developed services refers to 'the degree to which customers take part in creating, producing, and delivering new services that also includes the scope, intensity, role, and modes of involvement' (Nambisan, 2002). The conceptualization of term 'involvement' turns into complexity, particularly in case of new products and the product environments come out in different manners to relate the product stimuli presented to consumers (Sarmah et al., 2017). In the context of hotels, the experience of customers is created to be distinctive, and described by aspects that are highly flexible to the particular needs of customers. Such adaptations of customers are becoming standard in the M-commerce environment, where diversity of customer appeals and expose of individual preferences, and the equivalent service responses of hotels create a basis for co-creative service innovation (Kristensson et al., 2004). Accordingly, the involvement of customers with smartphone apps in hotels makes them to easily interact with service network, and thus they enhance the possibility of value co-creation (Kristensson et al., 2004), leading to customer co-creation/adoption intentions, considered as the antecedents of actual behaviour (Legris, Ingham, & Collerette, 2003). The consumers with their mobile apps can co-create value via providing reviews, sharing actual experiences and updates while staying in hotels (Oliveira & Panyik, 2015). Till now, very few research studies have examined customer involvement in the context of services (Alam, 2006). Thus, we hypothesize:

> H2. Customer involvement is associated with their adoption intention in the hotel service innovation via smart phone apps.

2.3. Need for interaction, customer involvement and adoption intention

Nambisan and Baron (2009) have discussed customer interaction characteristics in newly developed services in virtual service settings and the use of information system during the customer–firm interaction (Sarmah et al., 2017). This implies the importance of and need for interaction in hotels with smart phone apps (Dabholkar & Bagozzi, 2002). Notably, the influence of technology-mediated information systems on service ecosystem is an emerging field of discussion. The traditional interactions among customer–hotel formerly noticeable through customer and their staff are expected to extend as prospects to interact more genuinely by technology-intervened service environment (i.e. smart phone apps), which may improve the dialogue that is basic to co-creation (Lusch, Vargo, & O'Brien, 2007; Prahalad & Ramaswamy, 2004). Thus, the following hypotheses were proposed:

> H3. Customer need for interaction is associated with their involvement in the hotel service innovation via smart phone apps.

> H4. Customer need for interaction is associated with their adoption intention in the hotel service innovation via smart phone apps.

2.4. Consumer innovativeness, degree of co-creation and adoption intention

Degree of co-creation includes both the extent and strength of co-creation activities (Sarmah, Kamboj, & Rahman, 2017). The extent of co-creation is meant to the collaborative tendency of firms with consumers to develop new services during each step of new service development (e.g. idea creation, service development, its launch, and after launch activities (Hoyer et al., 2010). In contrast, the firms that are premier in co-creation may work together with customers in each step. The co-creation intensity refers to the level with which a firm may rely on the co-creation to newly develop services during a specific phase of service development. Thus, the firms, which are premier in their co-creation intensity during a specific phase of product development, rely completely on their customers concerning their development-related activities in that phase (Sarmah et al., 2017). Customers' involvement during service innovation is also known as the manner where firms collaborate with their customers (current and potential) at different phases of service development process (Alam, 2012), and to make sure that the developed services fulfil the requirements of

customers by considering their needs (Bitner, Ostrom, & Morgan, 2008). With the involvement of customers, firms can also convey high quality of services (Prahalad & Ramaswamy, 2004), have the benefit of speedy new service development processes (Iansiti & MacCormack, 1996), lower down cost, make a constructive image (Wikström, 1996), and build up advanced processes of learning as a result of association with customers in co-creation (Matthing, Sandén, & Edvardsson, 2004). Since tourists get highly involved with their smart phone and its apps during their tour and travels to remain in touch with the travel service environment, they enhance the possibility of value co-creation by such interactions (Kamboj & Sarmah, 2018a; Sarmah et al., 2017).

Consequently, tourists can contribute to value co-creation with their smart phone and its apps in terms of providing reviews based on their real experience and may revise while connecting with e-travel services (Kamboj & Rahman, 2017a; Kristensson, Matthing, & Johansson, 2008). Tourists' such type of interaction may make possible customer adoption intention, which is believed to be the precursor of their actual behaviour (Buhalis, 2003). However, because of the degree of co-creation derived from individual and other factors, it is important to explore the influence of tourists' degree of co-creation with tour and travel services using smart phones and its apps on their adoption intention towards service co-creation.

Customer co-creation can be considered as their approach to evaluate new services and products (Zwass, 2010). The consumers may contribute to the value co-creation via their mobile apps through providing reviews and updates online while staying in hotels (Oliveira & Panyik, 2015). Till now, very few research studies have been examined on how the customers are involved in service environments (Alam, 2006). Based on the above arguments, further two hypotheses are put forward:

H5. Consumer innovativeness is associated with their degree of co-creation in the hotel service innovation via smart phone apps.

H6. Customers' degree of co-creation is associated with their adoption intention in the hotel service innovation via smart phone apps.

2.5. Degree of co-creation and customer satisfaction

Customer satisfaction is viewed as 'reaction of customers to the state of fulfilment, and customer judgment of the fulfilled state' (Oliver, 1977, p. 482). Customers' satisfaction can be affected by their perceptions about the quality of service (Jain, Kamboj, Kumar, & Rahman, 2018; Zeithaml & Bitner, 1996). Actively involved customers show a higher degree of co-creation, which also helps customers to participate in controlling the outcome of the service process (Jo Bitner, Faranda, Hubbert, & Zeithaml, 1997). Empowered with the ability to contribute to the service creation process, customers feel more satisfied with the newly developed services (Jo Bitner et al., 1997). With increased use of smart phone apps among the customers, hotel customers are frequently able to interact with the service staff (Morosan, 2015) that also results in higher degree of co-creation. This increased degree of co-creation between customers and service staff via smart phone apps helps them to actively engage in developing new hotel services (e.g. menu designing). Customers become more confident about the service if they collaborate with service firms to co-create service using their smart phone and its apps.

Therefore, we posit that the degree of co-creation positively affects satisfaction.

H7. Customers' degree of co-creation is associated with their satisfaction in the hotel service innovation via smart phone apps.

3. Methodology

3.1. Sample and data collection

Data were obtained from the users of smartphone using survey method. Hotel guests in India, who used smart phones, have been considered as respondents for this study. The gap between numbers

of tourists and visitors specifies the significance of using tourism-related data set (Hall & Ram, 2018). Hotel guests are usually involved more with travel and tour-related activities (Kamboj et al., 2018). They have continuously used a number of technologies (smart phones, their apps and the internet) during their trip and travel. In addition, hotel guests are using smartphone apps for various activities such as to extend their hotel booking, to make online payments, to order food online, to take tour and travel package at their travel destination, to post their pictures and reviews regarding hotels and travel destinations, etc. Therefore, hotel guests were a suitable sample for the present study. The Government of India has classified hotels into different segments 'five-star deluxe', 'five star hotels', 'four-star hotels', 'three star and other hotels' and 'heritage hotels' (Annual Report of Ministry of Tourism, 2017). Therefore, for the current research, these were considered to define the term 'Hotels'. The final questionnaire was circulated in different hotels in New Delhi.

Firstly, the study purpose (i.e. to examine the customer perception in co-creative service innovation in the hotel context) was clarified to the respondents. Prior to collection of data from respondents, a few screening questions were asked from them to ensure their eligibility. The questions were: 'Do you have any Smartphone?', 'Did you use your Smartphone to book any hotel, tour and travel-related services ever?', 'Do you consider reviews and star ratings of customers while booking any hotel, tour and travel-related services, etc?' Although initially the respondents showed little hesitation, gradually they showed interest, as they understood the context of the study. Thus, we received adequate responses to study the effect of co-creation in service innovation.

Total 524 questionnaires were circulated among hotel guests and 230 usable responses were attained, with a response rate of 64.18%. In the total sample of hotel guests (n = 230), 130 (56.52%) were male and 100 (43.47%) were female. Among 230 participants, average age of male respondents was 26.2 and that of female respondents was 24.5. Of 230 hotel guests, 76 (33.04%) had qualification as intermediate, 73 (31.73%) were UG holders and the rest 81 (35.22%) were PG holders.

Furthermore, hotel guests were asked (a) to provide their annual household income and occupation, (b) to describe their travelling frequency per year and (c) to state the awareness of their smartphone apps and method of their hotel booking. The majority of respondents, i.e. 76 (33.04%), have their annual income more than 500,000 in Indian rupees. Similarly, most of hotel guests, i.e. 106 (46.08%), were business class. Most of hotel guests, i.e. 105 (45.65%), reported that they have travelled more than 5 times in a year at different travel and tour destinations. A number of respondents, i.e. 216 (93.91%), were aware about smartphone apps and out of the total, 61 (26.52%) stated that they always book their hotels using their hotel-related smart phone apps. More than half of all hotel guests approached, approximately 121 (52.61%), reported that they are involved in co-creative service innovation using their smartphone and its apps either once, sometimes, often or always.

The entire survey included three stages: first a few questions to screen out, second, 6 constructs with 23 items with another related questions, one to probe them (e.g. 'Which smartphone do you have?', 'What apps do you prefer to have in your smartphone', 'How much time do you spend to use smartphone apps?', etc.), and the last stage of questions was related to their demographic profile. Table 1 depicts the descriptions regarding the demographic characteristics of hotel guests.

3.2. Measures

In the beginning, a pilot test was conducted with student sample (n = 20, spend as a minimum 'one day and night in hotel' in India in the past three months) to establish the reliability of scale items adapted. The eligibility of sample respondents was decided based on the following conditions: every respondent should have any smartphone in the three months before the date of conducting pilot study, the respondent should be involved through smartphone apps via considering (reviews and ratings) or posting (their personal experiences and pictures related to travel and tour) or booking (tour and travel-related services) on online travel service company apps or their official website during their planning or their actual travel in the three months earlier than the date of

Table 1. Descriptive statistics of respondents' characteristics.

Categories	Frequency (S)	Per cent (%)
Gender		
Male	130	56.52
Female	100	43.47
Age (years)		
Male (average age)	26.2	
Female (average age)	24.5	
Education		
Higher secondary or less	8	3.48
Senior secondary or less	23	10
Diploma holders	45	19.56
UG degree	73	31.73
PG degree or above	81	35.22
Occupation		
Service class	76	33.04
Business class	106	46.08
Agriculture	07	3.04
Student or others	41	17.82
Annual household income		
Less than 200,000	27	11.74
Between 2 and 300,000	42	18.26
Between 3 and 400,000	31	13.48
Between 4 and 500,000	54	23.48
More than 500,000	76	33.04
Travelling frequency per year		
Once in a year	03	1.30
Two or three times in a year	37	16.08
Four or Five times in a year	85	36.96
More than five times in a year	105	45.65
Hotel reservation method		
Through hotel website/third party	92	40
Through a travel agent	44	19.13
Through a phone book	21	9.13
Through any known/relatives	07	3.04
Through smart phone apps	61	26.52
Any others	05	2.17
Smart phone apps awareness		
Yes	216	93.91
No	14	6.09
Innovative service co-creation using smart phone		
Newer	109	47.39
Hardly once or twice	05	2.17
Sometimes	43	18.69
Often	51	22.17
Always	22	9.56

Note: Total number of respondent = 230; age is measured as a continuous variable.

conducting pilot study. As all items were adapted from previously established scales, their reliability was determined using Cronbach's alpha coefficients (*a*). All values for coefficients were found in the range of standardized limit i.e. 0.70 or above, and thus acceptable too (Nunnally, 1978). In addition, two professors in the area of marketing and two full-time hotel service managers assessed all the adapted items for their modified wordings in context service innovations in hotel co-creation.

Before finalizing the questionnaire, we had interviewed seven hotel guests personally to express their views regarding their involvement with hotel employees and hotel booking apps with tailored available services or new service development. The hotels that were approached for this study had an existing evidence of their own smartphone apps and ample number of hotel rooms with well-equipped facilities (e.g. internet availability, swimming pool, multi cuisine restaurant, Gym, 24*7 room service, Board room facility, security with CCTV, gardens, free parking facilities, lift/elevators, power back-up, free Wi-Fi, etc.) that assisted hotel guests' to interact with the internal staff of hotels. These hotels had launched their own smartphone apps such as apps for hotel booking, e-

bill payment, service selection, e-wallets, interbank payments, etc., which increased the generalizability of present research.

For the present research, all items were borrowed from previously available scales and modified so as to fit in current research perspective (Appendix A). For all adapted items in support of each constructs, we have used seven-point Likert-type scale (strongly disagree 1 to strongly agree 7) (Sarmah et al., 2017). Consumer innovativeness (INNO) was evaluated with three items borrowed from Goldsmith and Hofacker (1991); Customer involvement (INV) was assessed with three items from San Martin, Camarero, and San Jose (2011). The degree of co-creation (CC) was measured using four items from Morosan and DeFranco (2016). The degree of co-creation which is based on the work of Morosan and DeFranco (2016) has been influenced by the work of Handrich and Heidenreich (2013), which talks about willingness to cocreate. Similarly, need for interaction (INTER) was measured with three items considered from previous studies (Dabholkar & Bagozzi, 2002; Sarmah et al., 2017). Adoption intention (AI) was measured using seven items from past research in this domain (Handrich & Heidenreich, 2013; Zwass, 2010); Customer satisfaction (SAT) was measured using three items from Grissemann and Stokburger-Sauer (2012). All the constructs and their related items are reported in Table 2.

4. Results

4.1. Common method variance (CMV) and non-response biasness

To check CMV, we used Harman's single-factor test (Chang, Van Witteloostuijn, & Eden, 2010). Each measure was effectively loaded in exploratory factor analysis (EFA). The results of this test show that there was no single factor that can explain maximum variance i.e. more than 50% (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Consequently, no 'general factor' is evident in the data analysed. Additionally, the correlation matrix is also examined. This matrix's results revealed that there was no variable that was highly correlated, and thus, CMV is not assumed to be a main concern with the data collected (Podsakoff et al., 2003). Similarly, non-response bias was also assessed. For this purpose, first 30 and last 30 responses were compared with the help of t-test, and findings show that there was no significant difference between both responses, thus non-response bias is not likely to be a major problem with these data (Armstrong & Overton, 1977).

4.2. Measurement model analysis

The data were analysed through structural equation modelling (SEM) with AMOS version 20. For this, initially, confirmatory factor analysis (CFA) was run to check the reliability and validity of adapted scale items and to establish measurement model (Gerbing & Hamilton, 1996). Then, structural model was established to determine the goodness of model fit. We used some common indicators to evaluate the measurement model. The goodness-of-fit index for measurement model was satisfactory and is reported in Table 2 with 316.21 of Chi-Square (χ^2) value ($p = .000$), Chi-Square/df = 1.97, 'comparative fit index (CFI)' = 0.96, 'normed fit index (NFI)' = 0.93, 'goodness-of-fit index (GFI)' = 0.92,

Table 2. Goodness-of-fit indices for measurement model.

Goodness-of-fit index	Model-fit result
Chi-square statistic	316.2 ($p = .00 < .05$)
χ^2/df	1.97 (<3.0)
RMSEA	0.052 (<0.06)
CFI	0.96 (≥0.9)
GFI	0.92 (≥0.9)
AGFI	0.91 (≥0.9)
NFI	0.93 (≥0.9)

'adjusted GFI (AGFI)' = 0.91 and 'root mean square error approximation (RMSEA)' = 0.052 (Hair, Black, Babin, Anderson, & Tatham, 1998). The factor loading of measurement model is reported in Table 3.

Next, the reliability and validity (convergent and discriminant) were confirmed for each measure. For this purpose, reliability was tested with Cronbach's alpha coefficients (a) and construct reliability i.e. CR (Hair et al., 1998). The calculated values for α and CR are found satisfactory, i.e. ≥0.60, and thus, indicate that all measures were reliable. The results of reliability test are shown in Table 3, including a values that ranged from 0.61 to 0.88 for internal consistency, and CR values that ranged from 0.76 to 0.92 (Bagozzi & Edwards, 1998).

Next, the convergent validity was tested with two conditions: factor loading in measurement model should be greater than 0.50 (Hair et al., 2006) and the values of average variance extracted (AVE) should be equal to or more than 0.50 (Fornell & Larcker, 1981). In the measurement model, the factor loadings of all items are above 0.50 with most being above 0.70 (Table 3). Similarly, the values of AVE are more than 0.50, thus both criteria have confirmed the convergent validity.

After that, discriminant validity was checked through the criteria suggested by Fornell & Larcker's (1981) and Kline (2005). The following criteria were used: first, square root of AVEs values should be more than their inter-construct correlations (Fornell & Larcker, 1981), and second, their inter-construct correlation should be less than 0.85 (Kline, 2005). The square root estimates of AVEs are found to be more than inter-construct correlations and the calculated values of inter-construct correlations are less than 0.85, thus confirming the discriminant validity (Table 4).

4.3. Analysis of structural model

A structural model assists to test the formulated hypotheses and conceptual model with theoretically established relationships. We used SEM to confirm the research hypotheses and establish associations in the research model. The goodness of structural model fit is found acceptable with Chi-Square (x^2) value (268.4), df = 148 and CMIN/df = 1.81. Figure 2 shows standardized values for path coefficients in the structural model, where bold lines depict the significant relationships and

Table 3. Measurement model-fit indices.

Scale items/ variables	Standardized item loading	a	Average variance extracted	Composite construct reliability
INTER1	0.69	0.62	0.83	0.83
INTER2	0.76			
INTER3	0.82			
INNO1	0.71	0.70	0.68	0.76
INNO2	0.58			
INNO3	0.74			
INV1	0.83	0.61	0.72	0.87
INV2	0.73			
INV3	0.71			
CC1	0.75	0.88	0.73	0.86
CC2	0.73			
CC3	0.82			
CC4	0.81			
AI1	0.73	0.77	0.72	0.92
AI2	0.78			
AI3	0.68			
AI4	0.81			
AI5	0.84			
AI6	0.72			
AI7	0.79			
SAT1	0.82	0.82	0.70	0.81
SAT1	0.78			
SAT1	0.72			

Notes: All variables were measured on a seven-point rating scale (1 = strongly disagree, 7 = strongly agree).

Table 4. Inter-construct correlation matrix

Constructs	1	2	3	4	5	6
1. INNO	**0.687**					
2. INV	0.432	**0.721**				
3. INTER	0.381	0.616	**0.832**			
4. CC	0.543	0.490	0.631	**0.733**		
5. AI	0.309	0.287	0.312	0.523	**0.724**	
6. SAT	0.297	0.271	0.304	0.372	0.451	**0.704**

Notes: The values on the diagonal represent the AVE values for all latent constructs. The values below the diagonal represent the squared inter-construct correlations ($p < .001$).

dotted lines show unproven hypotheses with insignificant relationships. Additionally, several model fits for structural model are calculated such as CFI = 0.94, RMSEA = 0.062, NFI = 0.91, GFA = 0.90, TLI = 0.93 and found suitable. The results reveal that all goodness-of-fit indices of SEM satisfy the cut-off range specified and also present a best fit to the data analysed (Browne & Cudeck, 1992).

4.4. Testing of hypotheses

One of the most important objectives in the present paper is to examine the customer point of view in service innovation in hotel co-creation context. Accordingly, the research model has been assessed to verify the proposed hypotheses of current research. Out of seven proposed hypotheses, five were supported. The first two hypotheses (H1–H2) state that consumer innovations positively influence their involvement and H2 specifies that their involvement with hotel-related smartphone apps led to their adoption intentions. Similarly, next two hypotheses H3 and H4, state that need for interaction has influence on customer involvement (H3) and adoption intention (H4). Furthermore, two hypotheses state that consumer innovativeness has influence on the degree of co-creation (H5), which in turn may influence hotel guests' adoption intention (H6) and customer satisfaction (H7). To gain more insights about which antecedent factors of hotel guests' adoption intentions significantly affect their intentions to adopt, the data analysis through SEM shows the following results (Table 5).

Interestingly, the results confirmed that consumer innovativeness positively influences customer involvement ($\beta = 0.19$, $p \leq .01$), and accordingly support H1. Our finding is related to the prior studies
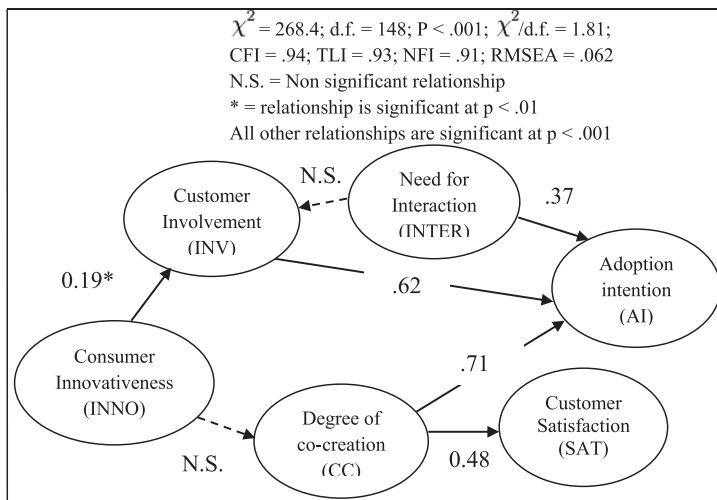
Figure 2. Final model with standardized path coefficients.

presented by Bartels and Reinders (2011), Morosan (2015), Morosan and DeFranco (2016), who found that consumer innovativeness affects customer involvement. The three important antecedent factors i.e. customer involvement ($\beta = 0.62$, $p \leq .001$), degree of co-creation ($\beta = 0.37$, $p \leq .001$) and need for interaction ($\beta = 0.71$, $p \leq .001$) have a positive and significant effect on hotel guests' adoption intention, and thus support H2, H4 and H6. All these results of our paper are supported by earlier studies by Grönroos (2008), Morosan (2015). These studies have ascertained that customer involvement (Morosan & DeFranco, 2016; Shao, Baker, & Wagner, 2004), degree of co-creation (Chathoth, Altinay, Harrington, Okumus, & Chan, 2013b; Morosan & DeFranco, 2016) and need for interaction (Lee, Jeong Cho, Xu, & Fairhurst, 2010; Morosan, 2015) do affect adoption intention. Degree of co-creation also has a similar positive influence on customer satisfaction ($\beta = 0.48$, $p \leq .001$), and therefore supports H7. This finding is aligned with the previous research studies by Grissemann & Stokburger-Sauer, 2012; Vega-Vazquez, Ángeles Revilla-Camacho, & Cossío-Silva, 2013, who have proved that customers' degree of co-creation does affect their satisfaction level. However, another theoretically identified relation, such as influence of need for interaction on customer involvement ($\beta = 0.12$, $p > .05$) and consumer innovativeness on degree of co-creation ($\beta = 0.09$, $p > .001$), was found to be insignificant, and thus unsupported the formulated hypotheses H3 and H5. Our finding is akin to the existing study by Morosan (2015). This existing research has also established that an individual's need for interaction does not have an effect on customer involvement. A few studies have also confirmed that consumer innovativeness does not affect the degree of co-creation (Gustafsson, Kristensson, & Witell, 2012; Jaakkola & Alexander, 2014). Thus, except H3 and H5, all other proposed hypotheses were supported (Table 5, Figure 2).

4.5. Testing of mediating effects

Baron and Kenny (1986) approach was used to assess the mediation effect. The mediating effect of degree of co-creation was checked among consumer innovativeness and two outcome variables (adoption intention and customer satisfaction). For both mediating effect relationships, two different mediation models were run (Tables 6 and 7). First, the direct effect of consumer innovation on adoption intention was checked, and found significant ($\beta = 0.274$, $p < .001$). In the next step, degree of co-creation as a mediating variable was inserted in the mediation model, it leads to insignificant influence between independent (consumer innovativeness) and mediating (degree of co-creation) variables ($\beta = 0.089$, $p > .05$). Based on mediation model, it was concluded that degree of co-creation partially mediates in between the relationship of consumer innovativeness and adoption intention (Table 6).

Another mediation model was run to test the mediating effect of degree of co-creation between consumer innovativeness and customer satisfaction. The results are discussed in Table 7. The direct effect of consumer innovativeness on customer satisfaction was found to be positive and significant ($\beta = 0.261$, $p \leq .001$). When the degree of co-creation was inserted as a mediating variable in the previously run model, the effect of consumer innovativeness on the degree of co-creation becomes

Table 5. Testing of hypotheses.

Hypothesis	Hypothesis Path	Coefficient	t-Value	Result
H1	INNO → INV	0.19*	3.15	Supported
H2	INV → AI	0.62**	2.46	Supported
H3	INTER →INV	0.12[ns]	1.15	Not supported
H4	INTER→ AI	0.37**	2.73	Supported
H5	INNO → CC	0.09[ns]	5.27	Not supported
H6	CC → AI	0.71**	6.27	Supported
H7	CC → SAT	0.48**	3.72	Supported

*Significant at 0.01 level.
**Significant at 0.001 level.
ns = not significant at 0.05 level.

Table 6. Results of test for mediation analysis (INNO – CC – AI).

	Model-1		Model-2	
	INNO – AI		INNO – CC – AI	
	AI		CC	AI
INNO	.274 (.05)**		.089 (.07)[ns]	.252 (.04)**
CC	–		–	.682 (.05)**

Model fit
Model 1: χ^2(62.5), $p < .00$; GFI = .93, NFI = .96, CFI = .98; RMSEA = .06.
Model 2: χ^2(83.4), $p < .00$; GFI = .92, NFI = .94, CFI = .97; RMSEA = .05.
Entries are standardized estimates (standard errors).
**$p < .001$; ns = $p > .05$.

insignificant ($\beta = 0.078$, $p > .05$). Thus, based on the results of mediation model, it was ascertained that the degree of co-creation partially mediates between consumer innovativeness and customer satisfaction (Table 7).

5. Discussion and implications

The present paper developed a conceptual model to study the customer perception regarding co-creation in service innovation, specifically in the context of hotels. The testing of proposed research model facilitates that innate characteristic of customers in M-commerce can be applied to understand the mechanism with which hotel guests become highly involved in co-creative hotel service innovation via their interaction with service staff. This confirmation also strengthens the extent of service-dominant logic to mobile-commerce (smartphone apps) service eco-system, particularly in the context of hotels. Accordingly, customers can operate as both operant and operand resources, such as operant resources in mobile commerce because they may easily interact with firms while integrating the operand resources, crucial to the achievement of co-creative newly developed service. However, to study the involvement of customers to co-create hotels, their innovativeness and adoption intentions have been confirmed and establish to be strong.

In addition, customers' involvement with some behavioural outcomes indicates that hotel service ecosystems foster co-creation. This co-creation helps in developing a culture of mutual value creation that further guides the stakeholders in creating superior service performance. Thus, the customers' co-creative behaviour may be used to force consumer innovativeness, which further leads to radical service development. In this study, the hypothesized predictor need for interaction, degree of co-creation and customer involvement were confirmed as most important factors of hotel guests' intentions to adopt co-creative newly developed services. The confirmation of all these three precursor factors of adoption intention also facilitates to add these new findings in theory in the following manner. First, conversion of customers' role from conventional passive customers to active co-creative customers of newly developed service innovation (Vargo & Lusch, 2008). Secondly, the importance on the firm ability of setting their relation with consumer and service eco-system to

Table 7. Results of test for mediation analysis (INNO – CC – SAT).

	Model-3		Model-4	
	INNO – SAT		INNO – CC – SAT	
	SAT		CC	SAT
INNO	.261 (.06)**		.078 (.05)[ns]	.227 (.06)**
CC	–		–	.476 (.05) **

Model fit
Model 3: χ^2 (46.8), $p < .00$; GFI = .91, NFI = .92, CFI = .96; RMSEA = .05
Model 4: χ^2 (67.8), $p < .00$; GFI = .92, NFI = .93, CFI = .95; RMSEA = .06
Entries are standardized estimates (standard errors).
**$p < .001$; ns = $p > .05$

represent the customer in co-creation process (Vargo & Lusch, 2004; Yi & Gong, 2013). There is gap in the literature that did not focus on the relationship between the customer involvement and their need for interaction that can also contribute to shaping their co-creation adoption intentions (Morosan, 2015). This paper closes this gap by showing strong hypothesized relationship between customer involvement and customers' need for interactions.

The findings support the first three assumptions of basic TBS. If a consumer is more innovative, he/she will get involved with hotel service staff (H1), and thus lead to their adoption intention of service innovations (H2). Customers' need for interaction has insignificant influence on hotel guests' attitude towards their involvement in the newly developed service processes (H3). However, guests' need for interaction significantly affects their adoption intention (H4). However, an innovative consumer does not always show high degree of co-creations (H5). Degree of co-creation significantly influences both intentions to adopt towards newly developed services (H6) and satisfaction of hotel guests (H7).

The results of present paper are aligned with the research outcomes of previous studies in literature. Consumer innovativeness and customer involvement significantly influence the customer adoption intention (Legris et al., 2003; Morosan, 2015). Similarly, the interaction need of hotel guests does not have any impact on their involvement in the context of smartphone apps-based service innovation (Morosan, 2015). Similarly, consumer innovativeness does not always significantly affect degree of co-creation (Morosan & DeFranco, 2016). Additionally, customer involvement is significantly associated with adoption intention (Sarmah et al., 2017). Degree of co-creation is positively related to adoption intention (Morosan & DeFranco, 2016) and customer satisfaction (Grissemann & Stokburger-Sauer, 2012). Degree of co-creation partially mediates between consumer innovativeness on adoption intention (Heidenreich & Handrich, 2015). Degree of co-creation partially mediates between consumer innovativeness and customer satisfaction (Hoyer et al., 2010). However, a hotel customer's involvement and their interaction needs are found to affect consumers' intentions to adopt new services (Lazarus, Krishna, & Dhaka, 2014). Customers' adoption intention towards newly developed service is mainly driven by their involvement, as involvement is subject to degree, intensity and scope of involvement. Similarly, in some cases, interaction may also result in adoption intention due to the match between the need of the customer and offerings of service provider, for which the co-creation process considers completed.

5.1. Theoretical implications

This paper presents a number of theoretical implications, which can be helpful to the both academicians and researchers. Firstly, this paper describes that the consumer adoption intention can also be explained with some relevant variables (for instance, degree of co-creation, need to interaction and customer satisfaction) and that is valid to the adoption intentions in hotel service context. Furthermore, the current research adds new insights to the consumer adoption literature through the influence of some important variables: customers' degree of co-creation and need for interaction on customers' adoption intention and customer satisfaction for the newly developed service. This research studied adoption and customer satisfaction with a number of variables such as individual differences and innovation characteristics (Heidenreich & Handrich, 2015), customers' degree of co-creation (Grissemann & Stokburger-Sauer, 2012) and customer satisfaction (Grissemann & Stokburger-Sauer, 2012).

Second, the current research investigates hotel guests' degree of co-creation in mobile commerce ecosystems and thus different from the customary system of attitude-intention-behaviour in the literature on adoption. Consequently, our research contributes to facilitate an approach via identifying attributes of customers, their co-creation behaviour and intentions that have an impact on their final adoption towards newly developed services and their satisfaction level.

Third, majority of extant literature in mobile commerce emphasizes use of mobile phones to access latest technologies (Morosan & DeFranco, 2016); our research facilitates valuable insights on the emerging concept of mobile commerce ecosystem, where the smartphone apps assist the

new services co-creation by customers. Therefore, the present research is among the revolutionary research, which examines the intention to adopt behaviour of customers towards newly developed co-creative services with smartphone apps and confirms that these mobile apps can exclusively lead to co-creation by hotel guests in service innovation (Cabiddu, Lui, & Piccoli, 2013). Thus, it can add new insights via extending the scope of service-dominant logic (Vargo & Lusch, 2008), which presents an important conceptual base to understand the way in which customers can co-create in services described by coexistence of technology with human-based interactions (Kamboj, Yadav, & Rahman, 2018).

Fourth, the current research conceptualized that consumer innovation acts as predecessor for their involvement with service maker that may generate positive adoption intention between the customers who participated in the co-creation process. The participants who co-create to design and develop a new service will be the first one to adopt the same. Towards this, the customers seem to be more reasonable and have suitable interaction opportunities to get more involved in the process of co-creation, although it may not significantly affect their adoption intention. Similarly, positive effect of consumer innovativeness leads to customers to co-create with the service staff and the degree to co-create partially influences the new service adoption intention.

Fifth, this study also reveals that increased customers' degree of co-creation may increase the satisfaction of the customer with the service provider. This is because if a customer is highly involved with a high degree of co-creation, they start perceiving that engagement and contribution of the service provider towards the goal are less than the highly engaged customer (Kamboj & Sarmah, 2018b). This result is also similar to the findings of Grissemann and Stokburger-Sauer (2012). However, the result may vary based on different service settings and a potential future research topic.

Furthermore, this study addresses the lacuna of the lack of empirical research on co-creation in hospitality industry (Edvardsson, Kristensson, Magnusson, & Sundstrom, 2011) that investigates the role of consumer characteristics and the role of technology-mediated environments in co-creation, by investigating the development of co-created new services with the use of smart phone apps. Accordingly, the current research assists to build up a distinctive and strong basis to deal with the challenges of confirming and conceptualizing the customer–firm co-creation, particularly in the context of hotels. Finally, grounded in a thorough quantifiable approach, the present research goes away from the principally theoretical and conceptual studies examining service innovation by customer co-creation and covers the research gap regarding dearth of empirical studies in the area of co-creation (Morosan & DeFranco, 2016).

5.2. Managerial contributions

The present research contributes several implications to the hotel managers. First, although the consumer innovativeness (INNO) did not have a significant impact on degree of co-creation (CC), there is a need for the companies to monitor which consumer and the consumer segment will be favourable for co-creation (Ernst, Hoyer, Krafft, & Soll, 2010). The consumer may not be a part of the process of co-creation if they are not able to communicate their preferences or they are loosely involved with the product and/ or services (Etgar, 2008).

Secondly, the hotel managers may consider the findings of present research to facilitate more interactions based on smartphone apps that may support co-creation. Through the co-creation process, customers can use their own creative talent to conceptualize their needs by putting together resources to reconstruct their actual experiences that are more valued for them. Moreover, use of mobile technologies also offers customization that can maximize the service experience.

Finally, and most importantly, the findings reveal that consumers' innovativeness positively affects customers' involvement, which in turn affects customers' adoption intention of newly developed service. However, customers' need for interaction may not always lead to their adoption intention. It is interesting that innovative consumers are co-creative and get involved with the hotel staff with their adoption intentions that may be a driving factor of their actual adoption behaviour.

Hence, policy planners and service providers must consider the above-mentioned variables, especially while developing different strategies.

5.3. Limitations and directions for further research

The present research is subject to a few limitations. First, the data were collected from respondents for whom Smartphone apps significantly contribute during their tour and travel-related activities. Furthermore, the research makes use of other methods of sampling to have more in-depth insights from the respondents who usually use smartphone apps in different intensities or for different reasons. Thus, the relevance of smartphone apps for hotel service innovation could be assessed based on hotel guest typology (e.g. heavy or not heavy users) and smartphone apps type basis, which may contribute more valuable insights in the current study. Then, the sample used in this research was confined to smartphone apps users in different hotels in India. Thus, the samples from diverse cultural background could demonstrate diverse findings. Lastly, understanding the intention to adopt behaviour of hotel guests in combination with smartphone apps is a research area where several factors may contribute a significant role towards consumer innovation to their satisfaction such as time–space differences, different service environments and cultural aspects, which may all contribute an important role and thus require more research interest in how they all influence preferences for customer involvement and their continuous intention to adopt the hotel-related smartphone apps. The findings of our study are still in the former stages in examining the influence of smartphone apps on hotel guests' adoption intention behaviour.

6. Conclusion

The present research provides valuable insights on service innovations in hotel co-creation context and validates that customer co-creation particularly in service innovation literature can renovate from a large number of related factors that are grounded in consumers' innovativeness, their interaction, level of involvement affected by service eco-system and information system. Additionally, the current research may add important insight to the existing literature in mobile commerce, service innovation, hotels and customer co-creation via providing the groundwork for a widespread theoretical background of customer co-creation in service innovation with probable extensions to the closest tour, travel and tourism and other industries in service sector (for instance, banking, retail, education and health care). The use of smartphone apps makes possible the more involvement of customers with hotel service staff and could signify the foundations for more personalized interactions that may result in service experiences, which are high in value. Lastly, the conceptual framework extended in this study may be adopted by other service industries, as it delineates a number of predecessors of involvement and intentions of customers to adopt and co-create.

Disclosure statement

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Appendix

Appendix A: scale items

Assume that the hotel has systems in place (e.g. an app or a website) that enable you, using your smart phone(s) and to access information (e.g. about local attractions, local transportation), buy services (e.g. room service meals, pay-per-view entertainment), or perform hotel-related tasks (e.g. unlock your guestroom's door, control room lights, temperature, connect to the in-room TV, check-in/out).

Adapted from

Consumer innovativeness (INNO)

INNO1	If I heard about a new information technology, I would look for ways to experiment with it via smart phone apps.	Goldsmith and Hofacker (1991)
INNO2	Being the first to use new high-tech services is very important to me using smart phone apps	
INNO3	I can usually figure out new high-tech products and services without help from others through smart phone apps	
**	Among my peers, I am usually the first to explore new information technologies using smart phone apps	

Customer involvement (INV)

INV1	When staying in hotels, I am very interested in the hotel-related services/information or tasks that I can access using smart phone apps	San Martin et al. (2011)
INV2	When staying in hotels, my level of involvement with the hotel-related services/information or tasks that are accessible using my mobile device(s) is high via smart phone apps.	
INV3	When staying in hotels, I am particularly involved with accessing hotel-related services/information or completing tasks by using smart phone apps.	

Degree of co-creation (CC)

CC1	When staying in hotels, I am actively involved in using my smart phone(s) and its apps to access hotel-related services/information or to do tasks.	Morosan and DeFranco (2016)
CC2	When staying in hotels, I rely on my experience from previous hotel stays to use my smart phone(s) and its apps to access hotel-related services/information or to do tasks.	
CC3	When staying in hotels, the ideas about how to use my smart phone (s) and its apps to access hotel-related services/information or to do tasks are predominantly suggested by myself.	
CC4	When staying in hotels, I spend a considerable amount of time using my smart phone(s) and its apps to access hotel-related services/information or to do tasks.	

Need for interaction (INTER)

INTER1	Human contact in providing services makes the process enjoyable for me when staying in hotels and connected through smart phone apps.	Dabholkar and Bagozzi (2002)
INTER2	When staying in hotels, I like interacting with the person who provides the service via smart phone apps.	
INTER3	When staying in hotels, it bothers me to use a machine when I could talk to a person instead using smart phone apps.	

Adoption intention (AI)

AI1	Buy products/services to be consumed during the current trip with the help of smart phone apps.	Handrich and Heidenreich (2013), Zwass (2010)
AI2	Make an online review of the current hotel services connected via smart phone apps.	

AI3	Provide updates about my current trip using smart phone apps.	
AI4	Create my own computer network within the hotel getting connected through smart phone apps.	
AI5	Connect to other in room technologies (e.g. to the TV to view content) via smart phone apps.	
AI6	Control room atmospherics (e.g. temperature, airflow, lighting, curtains) using smart phone apps.	
AI7	Access my room (as a room key) and other guest restricted areas with the help of smart phone apps.	
Customer satisfaction (SAT)		
SAT1	I am satisfied with the customer service of the hotel booked using my smart phone apps.	Grissemann and Stokburger-Sauer (2012)
SAT2	All in all, I am very satisfied with the visit in this hotel via booking room using my smart phone apps.	
SAT3	The purchase in this hotel via smart phone apps has met my expectations.	

Notes: Respondents were asked to rank from 1 to 7 their level of agreement or disagreement with the following above statements;

**Items dropped due to low factor loadings (<0.50; Hair et al., 1998) while applying exploratory factor analysis during scale purification stage; the significant standardized item loadings are reported in Table 3.