A comparative study of self-service technology with service employees: A qualitative analysis of hotels in China

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Abstract

The rise of self-service technology (SST) has transformed the lodging industry. Clarifying how hotels and customers can use SST offers insights for hoteliers and fills a research gap regarding SST and the service employees such technology replaces. To accomplish these aims, the researchers held 4 focus groups followed by 60 in-depth interviews with hoteliers and customers, respectively, to explore the role of SST relative to service employees and their influences on SST use. Findings revealed seven comparison dimensions between SST and service employees along with employees' influences on SST use. SST were more effective than service employees in terms of cost savings, consistent service quality, and provision of high-tech customer experiences. However, service personnel tended to outperform SST in communication, ease of use, usefulness, and high-touch experiences. The merits and disadvantages of SST are dynamic and related to interactions among SST, users (hotels), end users (customers), and alternative service agents (employees).

Keywords: self-service technology; service employee; hotel; comparison; prospect theory

1 Introduction

The proliferation of technology has drastically altered service delivery in the hospitality industry (Meuter et al. 2005). In the 1940s, hotels began to use telephones for reservation services. In the 1990s, numerous hotels started building websites (e.g., Hilton.com and ChoiceHotels.com), and third-party websites (e.g., Booking.com and Venere.com) focusing on online hotel reservations emerged. In contemporary society, hotels staffed by robots are beginning to appear. The potential of technology to supplement or replace interpersonal services in the hotel industry appears promising (Lee 2016). Self-service technology (SST) has the potential to revolutionize service delivery by enabling customers to have independent experiences with minimal personnel involvement (Meuter et al. 2000; Lema 2009). The possibilities of SST seem endless (Meuter et al. 2000), and hotels are no stranger to this trend; firms continue to invest in SST applications, including self-check-in/check-out systems, self-service ordering gadgets, and robots (Shin and Perdue 2019).

Although the SST application in hotels in China started late, it has been developing rapidly in recent years, and China has been a pioneer in testing and applying SSTs in hotels (Hertzfeld, 2018). For instance, a series of projects targeting self-service-based technologies and artificial intelligence have been announced, including "Future Hotel," "Future Hotel 2.0", "WeChat Eco Hotel," and "Easy Stay" in China since 2015. In late 2018, Alibaba group opened its first future hotel named after Flyzoo Hotel. This futuristic hotel is featured by the complete use of latest technologies (e.g., robotic technologies), attracting the world's attention.

Despite these advances, the future of SST in the hotel industry remains unclear (Kasavana 2008). Although investments in and the capabilities of SST are continuously evolving, overall adoption and utilization of such technology is relatively limited (Wei et al. 2017). Compared with conventional human services, SST is relatively new, and little is known about hotels' SST options (Kucukusta et al. 2014). Although academics have begun to pay attention to customer adoption of SST, such studies often separate SST from manpower, neglecting their potential interactions and declining to offer organizational perspectives on SST use in service (Eriksson and Nilsson 2007; Gelderman et al. 2011; Shin and Perdue 2019). SST should therefore be investigated in a context that considers all service agents and channels rather than in isolation. Lack of consideration may insulate SST applications from reality and lead to biased findings. Accordingly, the extent of changes following from SST relative to service employees warrants further attention. While the debate around 'human touch' versus tech in the hospitality domain has been mentioned in the literature (Wei et al. 2016), studies have not yet proposed a satisfactory resolution to the dilemma among service delivery channels (e.g., SST and service employees).

To address this gap, the current study intends to understand the role of SST compared with service employees in hotels along with considerations informing SST use. Given the crucial roles of customer responses and practitioners' opinions in the successful application and promotion of new technologies (Zhang and Dhaliwal 2009; Ozturk and Hancer 2014), both customers and hoteliers were recruited in this research. Elucidating customers' and practitioners' viewpoints enhances our knowledge and interpretation of SST compared with human services. Also, a clear comparison of SST and human services can help hoteliers make rational decisions around SST investment and formulate effective strategies for service channel management.

2 Literature Review

Since the appearance of pioneering SST devices (e.g., vending machines), technology has continued to advance (Meuter et al. 2000). A push for academic studies has accompanied this evolution (Stoshikj et al. 2016). Drawing on various theories such as the theory of reasoned action, theory of planned behavior, and technology acceptance model (TAM) or extended TAM, scholars have investigated how customers' behavioral intentions are influenced by their attitudes, SST features (e.g., ease of use), customer traits (e.g., technology readiness), situational factors (e.g., waiting lines), and task complexity (Wang et al. 2012). Another literature stream has focused on the changes resulting from SST, including its influences on customer commitment (Wei et al. 2016), donation behavior (Hanks et al. 2016), choice of hotel brands (Kucukusta et al. 2014), and evaluations of service encounters (Giebelhausen et al.

2014). Customer experience creation has begun to garner academics' attention as well (Kelly et al. 2017; Wei et al. 2017).

However, a majority of theories and most studies have overlooked the multi-channel nature of service delivery to solely explore the independence of SST from manpower. In reality, multiple service delivery channels coexist (e.g., SST and service employees) (Sousa and Voss, 2006). Use of traditional channels (e.g., face-to-face interaction) will not be replaced by SST autonomously (Pieterson and Ebbers 2008). According to reference-independent preference, decision making is influenced by the reference point of an alternative state (Kahneman and Tversky 1979). Consequently, one must consider such alternative states when exploring SST. The present study attempts to explore SST adoption by taking service employees into consideration. Specifically, this study aims to explore the discrepancies between SST and service employees along with their influences on customers' and hoteliers' decision making around SST adoption.

Scholars have estimated that the benefits (i.e., convenience, self-control, consistency, and cost and time savings) of SST will surpass those incurred through interpersonal service (Selnes and Hansen 2001; Kasavana 2008; Oh et al. 2013; Considine and Cormican 2016). Although the merits of SST may appeal to service firms (Karadag and Dumanoglu 2009), not all operations benefit from such technology (Ba et al. 2010). Some researchers and practitioners have questioned the purported benefits of SST and pointed out associated negative effects. For example, Kokkinou and Cranage (2015) and Oh, Jeong, Lee, and Warnick (2016) highlighted lower labor costs due to SST, whereas Hilton, Hughes, Little, and Marandi (2013) expressed concerns about the effectiveness of using SST to save money and heighten efficiency. Kasavana (2008) indicated that investment costs may impede a restaurant from providing self-service. Other scholars stated that SST provides standardized service (Kokkinou and Cranage 2015; Oh et al. 2016), thus decreasing deviations in service quality (Selnes and Hansen 2001). Still others have argued that standardization, which can lower time and costs, comes at the expense of customization that requires time and money (Ba et al., 2010; Wang et al. 2010). Customization that cannot be achieved without human involvement is seemingly incompatible with the saved time due to SST (Kokkinou and Cranage, 2013; Wang et al., 2010).

Other SST benefits relate to flexibility, fun, and entertainment (Kim and Qu, 2014; Rosenbaum and Wong, 2015), while some scholars contended that eliminating service providers may hinder flexibility, customization, and spontaneous delight for customers. Service recovery efforts and customer loyalty might be compromised as well, along with employee resentment of SST as evidenced by more distant social bonds between customers and hotels (Ba et al. 2010; Kim and Qu 2014; Oh et al. 2013; Selnes and Hansen 2001). The pursuit of SST-related benefits arguably runs counter to the emphasis on employee-customer service encounters in

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luxury hotels (Kucukusta et al. 2014). Some hoteliers may be interested in SST to promote better service and enhance customers' experiences, thereby boosting customers' satisfaction and loyalty and increasing firms' return on investment (Oh et al. 2016; Kelly et al. 2017). Nonetheless, customers' responses to SST have been inconsistent, with some reporting richer experiences (Kasavana 2008) and others citing negative experiences and lower satisfaction and customer loyalty (Selnes and Hansen 2001; Meuter et al. 2003; Giebelhausen et al. 2014).

The preceding review reveals ambivalence surrounding the merits and limitations of adopting SST, particularly in terms of service employees. However, a holistic view and empirical support for these issues has yet to be developed. In the retailing literature, academics have begun to notice the multifaceted nature of service delivery channels and examine the influences of interpersonal service quality and SST service quality on retail patronage intentions (Sousa and Voss, 2006; Lee and Yang, 2013). However, in hospitality and tourism, most studies on SST adoption have only examined the influences of the need for interaction (e.g., Oh et al. 2013), whereas neglecting other aspects of staff services. Panda et al. (2011) and Beatson et al. (2006) represent exceptions in that their research considered the influences of personal service attributes on hotel guests' overall satisfaction. However, discrepancies between SST and service employees (and employees' influences on technology adoption, particularly of organizational technology) remain underexplored. This study therefore seeks to explore the role of SST compared with service employees along with workers' effects on organizational and individual SST adoption decisions by using an inductive qualitative approach.

3   Methodology

Oh et al. (2016) pointed out that "an interview or focus group study of recent users of both SSTs and staff services may offer a good opportunity to compare the reasons and motivations for choosing one against the other transaction method" (p. 260). Adding that the literature review shows that there are limited evidences for the benefits of SSTs promoted in previous studies. Prior studies just mentioned the advantages of SSTs in the introduction. Some of these statements were even conflicting. Thus, this study adopted a mixed qualitative method (focus group followed by in-depth interviews) to examine SST implementation compared with human services in hotels in China.

More specifically, a focus group involves informal discussions in which a few group participants interact with others regarding a particular topic (Edmunds, 1999; Harding, 2013). Such interactions allow participants to explore and reconsider their views (Edmunds, 1999; Waller et al., 2016). Another advantage of focus group is that shared brainstorming can generate fresh ideas, which helps researchers reach a deeper understanding of participants' opinions (Edmunds, 1999; Waller et al., 2016).

In-depth interviews were also conducted considering its inherent advantages. Interviews enable researchers to delve deeply into responses (Johnson and Turner, 2003; Morris, 2015). Rather than acquiring simple answers by asking questions one by one, in-depth interview allows for follow-up questions and encourages respondents to explain their answers (Veal, 2011) to obtain more in-depth and richer information (Johnson and Turner, 2003).

Additionally, this combination of qualitative methods contributes to the reliability of our study. Willis (2007) argued that research including more than one data collection method is more persuasive than those relying on a single method. Questions highlighting the advantages (pros) and disadvantages (cons) of adopting self-service technology in hotels in China in comparison with traditional interpersonal service were asked in both focus group discussions and in-depth interviews.

In our research, focus group discussions were conducted first to obtain an overview of SST implementation in business from hotel practitioners' perspectives. Data were collected in Shenzhen, China, with participants who were practitioners from hospitality organizations in various cities (e.g., Shenzhen, Guangzhou, Beijing, Shanghai, Changsha and Shenyang). Prior to formal data collection, a pilot focus group was held to examine the appropriateness of discussion questions. This focus group was excluded from the final data analysis because participants were doctoral students rather than hotel practitioners. During formal data collection, 30 hotel practitioners working in different positions were allocated across 4 groups (Table 1). The average age of participants was 36 years, and their average work experience was 14 years. After a brief introduction to the research, questions related to applying SST in hotels in China were discussed. With participants' consent, all discussions were recorded and later transcribed (Kelly et al. 2017). Discussions lasted 72.5 minutes on average.

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Table 1. Demographics of Focus Group Discussion Participants

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To develop a more complete understanding of SST compared with service employees, another 30 hoteliers and customers were recruited for in-depth interviews, respectively. In-depth interviews were conducted from January 2018 to April 2018. This study was not confined to recruiting managers of hotels where SST was already being implemented; instead, any hotelier familiar with SST in a hospitality context (e.g., restaurant) could participate, even if his/her hotel has not yet deployed SSTs. Hotelier informants were recruited from different types of hotels and had different ages, genders, positions, and work experience (Table 2). Hotel managers ranged from 28 to 56 years old and had worked in management for between 2 and

more than 22 years. Customer interviewees who had adopted SST and human services within the past 12 months were recruited, echoing a call from Oh et al. (2016) for research to recruit recent users of SST and human services. Customer participants ranged from 8 to 55 years old (M = 30 years). They had different education levels and had stayed in different types of hotels. Recruiting diverse informants ensured sound triangulation, reinforcing the study's validity and reliability (Willis 2007). With interviewees' consent, all interviews were recorded and later transcribed literally (Kelly et al. 2017). Interviews with hotel managers and customers lasted 70 minutes and 59 minutes in average, respectively.

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Table 2. Demographics of In-depth Interview Participants (Hotel Managers and Customers)

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Before conducting data analysis, a professional transcript company was employed to transcribe the recordings from focus group discussions and in-depth interviews. Then, one of the authors examined each transcript word-by-word. Next, content analysis was adopted to analyse information from focus group discussions and interviews. With the help of NVivo 11, 7 comparison groups were identified. First, raw data units were labelled to reflect what they represented (Creswell and Clark, 2007). Then, codes were grouped into categories according to similar meanings. Next, opposing categories comprised a comparison group. Codes and groups were continually adjusted based on similarities and differences (Harding, 2013).

To avoid conflicts and uncertainties, the two authors versified the identified comparison groups independently. Besides, consistency through time, another technique to secure reliability, was adopted (Prothro, 1956). That is, the coder performed the first coding of focus group and data analysis in July 2017 and repeated it in February 2018 and September 2018. Also, the researcher finished the first-round coding of interviews with customers in August 2018 and repeated data analysis in November 2018, while the first-round coding of interview with hoteliers was conducted from August to September 2018. Then, the coding was repeated in November 2018 and early December 2018.

4 Findings

The results of this study confirmed the co-existence of SST and service employees in hotels. More importantly, findings revealed the influences of human services on SST application in hotels and seven comparison points between SST and human services: cost, service quality deviation, efficiency, customer experience, communication, ease of use, and usefulness.

4.1 High Costs vs. Cost Savings

Labor costs far exceed those of SST. Thanks to SST's capability of replacing human services, most hoteliers expressed that they were attracted by SST's lower costs associated with labor, operations, and service. Although a few of hotel practitioners expressed concerns about the investment and maintenance costs of SST, others argued that as technology evolves, these costs will decline dramatically--particularly as SST begins to scale. A practitioner from Group 4 explained, "*The investment cost seems high at present. However, when [the technology] scales, the cost will be reduced.*" However, for customers in China, labor was not a scarce resource. In customers' opinions, labor cost in China was not as high as that in other countries such as the US (Customer #13 and Customer #19). Customer #19 further explained that as she has paid money for human services, hotels should not use SST to reduce labor.

Cost savings from SST also appeared to be related to hotel age. Specifically, SST was thought to conserve costs for hotels under construction, while may augment investment in already-built hotels. First, when old hotels opened, SST was not popular, hence leading to the lack of SST integration. One manager explained, *"This hotel has been open for about three years. At that time, there was no large-scale promotion of SST, so it was not involved in [digital check-in]"* (Manager #2). Another consideration is that reconstructing hotel hardware or opening ports to meet the requirements of SST operation require substantial investments in money and time.

4.2 Unstable Service Quality vs. Less Service Quality Deviation

Customers and hoteliers in this study both criticized the inconsistent quality of human services. In their opinions, the quality of human service was closely related to employees' emotions, level of professionalism, and external factors. For example, human services can be satisfactory one day but disappointing the next due to a service employee's foul mood, as illustrated in the following commentary:

> *"In the service industry, service is not certain. There is no way to guarantee service quality because of human elements. The service employee may be in a bad mood today. It is possible that this employee is not well trained or has no experience. Therefore, we have no way to control these things at the management level. Yet the service employee is the first contact point for the customer on the front line, meaning [the employee] affects service quality."* (Manager #25)

However, SST offers standardized service and has garnered customer praise, such as for consistent service: *"Services provided by machines stay at the same level and are unlikely to fluctuate"* (Customer #2). Yet, Customer #6 contended that there would be no differences

among hotels if personnel were all replaced by SST. In this respect, he would not pay high fees to stay at a luxury hotel.

4.3 Low Efficiency vs. Increased Efficiency

Hoteliers and customers both indicated that service delivery from employees could sometimes be problematic. They further noted that the efficiency of human services was low. In their eyes, service employees' work efficiency could easily be negatively influenced by other factors. By contrast, as Manager #13 explained, the development of technology may change this situation. The emergence of SST provides possibilities for simplified service delivery, fewer service delivery steps, and better efficiency. Manager #11 gave the following example: *"[A smart speaker] probably reduces the step of human service. It works as long as you speak the language of service"*. Manager #7 suggested that the efficiency of the check-in and check-out process could be greatly improved by self-check-in kiosks, which would shorten the queue. A customer concurred: *"[Mobile check in] saves me from going to the front desk. Yes, it is appealing"* (Customer #4).

On the contrary, some informants expressed concerns about mobile-app-based technologies. For example, Customer #9 found it troublesome to download apps if she did not travel frequently. A lack of clear instructions about how to use tech-based functions in hotels could also result in frustration. Customer #8 shared that she had no idea about how to open her room's curtains because there were no instructions. Although Customer #10 hoped that *"robots are able to provide some efficiency"*, Manager #15 indicated that robots were not that fast but rather as slow as the internet was at first. However, managers generally thought that *"[SST] will be worth the investment if its speed and efficiency are enhanced enough to meet customer needs"* (Manager #7). Customer informants shared similar views.

4.4 High-touch Experience vs. High-tech Experience

According to hotel practitioners, service employees can provide customized service according to subjective evaluations of customers' occupations, emotions, clothing, characteristics, and hobbies. Hotel manager #25 shared that professional front desk employees can alter a customer's poor mood simply by being nice, which cannot be achieved using SST. Hoteliers also indicated that service employees could satisfy customers' needs for interaction by listening to and conversing with patrons. Services provided by employees involved emotions, and customers could receive much more warm, friendly, and compassionate service compared with SST-based services. For instance, *"In addition to the things you want to achieve, human beings bring you more care and warmth"* (Manager #13). By contrast, *"It is impossible for a robot to provide this kind of humanistic and caring service, but nowadays what motivates customers*

most is caring service" (Manager #19). *"A machine is certainly emotionless and can never react like a human"* (Customer #26). *"If people are replaced with robots, there will be no warmth but [it will be] as cold as ice"* (Customer #13).

In particular, luxury or resort hotels should carefully consider SST. These accommodations are renowned for high-touch human service. Customers may be unhappy if they encounter impersonal SST. These patrons will have also paid expensive room rates for high-quality human service. Even so, luxury hotels may wish to provide some SST-based services given that these hotels must offer more services than economy hotels (i.e., economy hotel services must be provided by luxury hotels as well). As Customer #16 explained, *"Given that economy hotels have already used SST, as an upscale hotel, you are supposed to catch up with the era."*

At the cost of high-touch staff services, hotels may attempt to enhance customer experience by providing novelty, safety, privacy, convenience, a sense of participation, control, and freedom. Manager #7 reported that *"The feedback is that customers are curious about robots."* A customer also noted that *"I think [SST] is interesting. Therefore, if the hotel has robots, I will definitely go to experience them"* (Customer #21). However, *"At present, the sensibility of a robot, or its ability to surprise people with delight, is still limited"* (Manager #15), and customers' surprise and delight may decline as the popularity of SST increases. Customers indicated they would like to use robots out of curiosity and novelty (Customers #5 and #9). Yet, after the first time or thereafter, they may not actively use such technology as the novelty fades (Customers #12 and #23). Some customers also indicated that they may become accustomed to SST and eventually consider it nothing special.

Customers and hotel managers pointed out that SST is available 24/7. In hoteliers' opinions, SST do not require rest, sick time, or breaks; customers can check in or check out anytime and anywhere via mobile check in/out. On the contrary, customers and managers stated that human services were not convenient enough. Overall, however, hotels and customers tended to ignore the convenience of SST in favor of convenient human services.

Moreover, according to hotelier managers, customers' sense of participation can be enhanced by SST. From managers' points of view, SST is preferable to service employees devoting themselves to service production while leaving customers waiting. SST removes employees' direct involvement and is customer-controlled, thereby improving customer participation. Hotelier informants also mentioned that customers preferred to take photos or videos to share their experiences on social media, but customers consider hotels a person-oriented service industry and *"Expect to be served by humans"* (Customer #6). From patrons' perspectives, hotels should help customers check in instead of shifting the responsibility to customers.

4.5 Two-way Communication vs. One-way Interaction

SST applications can inhibit hotels' communication with customers by eliminating service employees' direct involvement. Respondents stated that face-to-face interaction is the most effective communication method in all cases. *"For instance, a service staff may ask customers what else they need"* (Customer #20), and customers can negotiate with service employees in a timely manner to fulfill requests. Comparatively, SST entities simply finish their tasks as programmed with no room for two-way communication. Customers cannot offer relevant feedback or express other needs when receiving SST services, which constrains communication between customers and hotels. Similarly, hotels cannot get in touch with their customers actively or in a timely manner. One manager said, *"On the other hand, it [SST] is not convenient for us to communicate with customers. That is, we can receive customer's requests, but our requests cannot reach customers"* (Manager #6).

4.6 Ease of Use vs. Complexity

Compared with the ease of use and generalization of human services, SST use requires customers' mastery. Customer informants stated that some SST devices (e.g., self-check-out technologies) were only suitable for customers with certain skills. Taking self-check-in kiosks at airports as an example, Customer #13 outlined three requirements for customers to master SST: operation skills, willingness, and age. Compared with youth who have grown up in an information era, elderly individuals are less familiar with SST. These customers' physical capacity also declines gradually, limiting their technology mastery. Customer #24 (age 52) said that her reduced acceptance of technology is based on the natural law of aging.

Difficulties with using SST could consume hotel guests' time, reduce efficiency, and contribute to negative customer experiences: *"If you do not know how to operate [a self-service kiosk for an invoice], you have to wait there. Somebody has to come and teach you how to operate it"* (Customer #23). Customers #11, #21, and #24 were agitated due to their incapability to use intelligent lights in their hotel rooms. Informants from Groups 1, 3, and 4 emphasized the high learning cost associated with using intelligent curtains and lighting. However, if an SST is easy to use or its interface is simple, hotels and customers tended to prefer it. *"This is where the user interface of the app comes in. If the app is complicated, I will get tired of using it. Hence, I will stick with the traditional way"* (Customer #7).

4.7 High Usefulness vs. Limited Functionality

Customers and hoteliers criticized the simple functions of SST devices compared with service employees whose duties are rather broad (Manager #8). In participants' opinions, a waiter at restaurants manages customers' diverse needs in addition to helping them order food, serving

dishes, and collecting plates; conversely, robots simply deliver goods and fulfill no other functions. What is worse, due to capacity limitations, only certain types of goods can be delivered via SST. For instance, robots can deliver slippers but not quilts.

Moreover, different from the flexibility of service employees, informants stated that SST entities could be rigid and inflexible when dealing with customer needs, leading to service failure. In their views, service employees were adept at addressing customer requests. By contrast, when customers had immediate requirements, SST devices were not adaptable enough to satisfy them. Patrons then had to exert extra effort to gain the service they wanted. Even so, some customers indicated that as technology develops, many personalized services should become available:

> *"We are now fully able to take advantage of modern technologies to achieve a lot of personalized services. Well, actually, from the perspective of product production, it is also the embodiment of customized service for tourism products in the hotel service..."* (Customer #28)

Furthermore, although some informants argued SST resulted in fewer errors than human services, SST devices could make mistakes due to external factors (e.g., network malfunctions, power loss, or issues with the user interface). Customer #20 indicated that children may intervene in SST operation. Customers and managers also said service failure may result from internal limitations. For example, a smart speaker may fail to recognize customers' needs because it cannot understand a foreign language (e.g., English), dialect, or accent. Additionally, customers and hoteliers in this study expressed concerns about SST devices' abilities to manage service failures. When service failures occur, customers expect service employees to be available or will otherwise *"Complain about why no people are here"* (Customer #22). Hoteliers especially emphasized the role of service employees' empathy in handling service failures.

At the current stage, hoteliers and customers both regarded innovative SST options as entertainment rather than useful tools. Manager #15 explained, *"Now I feel like that robots play more of an entertainment role in the hotel. It is not likely we will have to use them."* Customers provided more direct evidence: *"Yes, I will play with [Tmall Genie, a smart speaker] as I play with Siri, but I will not use it for anything real"* (Customer #4). However, Customer #10 and Hotelier #15 anticipated positive outcomes from SST devices. From their perspectives, the technology will become gradually updated and more refined in the future.

5 Discussion

Although SST is rapidly transforming the lodging industry (Lema 2009), innovative SST devices remain relatively new in hotels and have attracted limited awareness (Kucukusta et al. 2014). Given the increasing popularity of SST in service encounters, we conducted 4 focus groups followed by 60 in-depth interviews with hoteliers and hotel guests to compare SST services to service employees. Based on the research findings, a comparative framework of SST with service employee was developed (Figure 1). This framework clarifies the discrepancies between SST-based services and human services from 7 aspects, namely, cost, service quality deviation, efficiency, customer experience, communication, ease of use, and usefulness. Besides, this framework indicates that these discrepancies influence hotel's and customer's preference for SST (dotted arrows in figure 1), and customer's preference influence hotel's prefernece (solid arrow in figure 1). More specifically, SST devices were considered better than service employees in terms of cost savings, reducing service quality deviation, and offering high-tech customer experiences, all of which support SST adoption. Conversely, SST performed worse than service personnel in communication, ease of use, usefulness, and high-touch services, which can negatively influence SST adoption in hotels. However, these merits and disadvantages were found to be mutually transformative according to the features of SST and characteristics of alternatives (service employees), users (hotel), and end users (customers).

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Fig. 1. A comparative framework of self-service technology with service employee

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Our findings indicated that the benefits of SST were relative to those of service employees. This trend aligns with reference-independent preference, which posits that discrepancies have a reference point (Kahneman and Tversky 1979). For example, costs saved when using SST are relative to high labor costs. On the contrary, if labor costs are relatively low, the competitive advantage of SST disappears. The stable service quality, efficiency, or convenience provided by SST devices may exceed that offered by service employees; however, if human services can be stable, efficient, and convenient, then hotels and customers will likely continue to favor conventional human services.

Moreover, service employee characteristics may transform SST merits into disadvantages. For instance, if a service employee is in a good mood, then he or she will likely provide high-touch services. In this respect, the rigid experience provided by SST may present a disadvantage. By contrast, service employees can be easily distracted by external factors, leading to unstable services, poor efficiency, or other issues. In this case, one of the disadvantages of SST (i.e.,

inflexibility) becomes a benefit given its stability. This pattern is consistent with service automation advantages mentioned by Selnes and Hansen (2001), who suggested that service automation results in fewer service failures. Less deviation in service quality may result from standardization of SST-based services (Schumann et al. 2012), which can thus maintain a certain level of service quality (Kaushik et al., 2015; Kim & Qu, 2014).

SST benefits were also found to be associated with inherent SST features such as the human–computer interface and maturity of technology. This research revealed that functions of current SST devices are overly simplistic, and the devices themselves can be challenging to use and lack personalization compared with service employees' various roles and ease of use. The perceived usefulness and ease of use of SST adoption may not always apply (Kaushik et al. 2015); however, as technology develops, SST will receive additional updates so it becomes more helpful, easier to use, and offers personalized services. Over time, current associated disadvantages of SST may well disappear compared with human services.

In addition, this study further revealed that SST-related benefits and costs can be altered by customer differences (e.g., customers' perceptions of labor costs, hotel image, first-time users, operation skills, demographics, and willingness). For instance, greater customer participation may be considered a constraint, as customers may contend that hotels should not shift their responsibilities to customers. This critique reflects the findings of Hilton et al. (2013) in that the value customers gain from SST must be no less than their co-production role. Service employees may need to prepare everything for certain customers. Furthermore, although SST devices can surprise and delight first-time consumers, such reactions may decline with repeated use. More importantly, if customers cannot use SST due to skills limitations, undesirable experiences may follow.

SST benefits are also tied to hotel characteristics (i.e., age, category, and grade). These merits are more applicable to a hotel under construction or business and economy hotels. Such merits likely function as hindrances for already-built hotels, resorts, or luxury hotels. For instance, a built hotel has already devoted extensive money and time to construction. If the hotel decides to incorporate SST services, substantial money and time will be needed to revamp hardware (e.g., line reconstruction) to satisfy SST operation requirements (e.g., robots). In the end, money may not truly be saved.

In short, SST benefits are dynamic and related to users (hotels), end users (customers), and alternatives (service employees). This mutual transformation and dynamicity is consistent with the concept of affordances, which emphasizes the dynamic interaction between technology and users and overcomes the limitations of theories focusing exclusively on psychological or social

behavior (Majchrzak and Markus 2012). That is, benefits can be costs depending on hotels' characteristics, customer differences, and features of service employees and SST.

5.1 Theoretical Implications

The theoretical contributions of this work span four aspects. First, the comparative framework of self-service technology with service employee (Figure 1) enriches our understanding of consumer and organizational behaviour. Although theories such as TAM remain useful for understanding individual technology adoption, they separate SST from workforce, neglecting the multiple nature of service channels and their possible interaction. Previous studies separately explored the significance of technological factors and human services on hotels' success and development (Bitner et al., 1990; Yadegaridehkordi et al., 2018). Although the literature on SST adoption has explored influences on customers' needs for interaction (Oh et al. 2013), scholars have largely ignored the influences of other aspects of staff services and rarely allocated attention to organizational SST adoption (Eriksson and Nilsson 2007; Gelderman et al. 2011; Shin and Perdue 2019). Consistent with reference-independent preference, the finding indicated that whether customers and hotels think an SST is beneficial hinges on the merits of human services. That is, customers and hotels pay more attention to the degree of the changes brought by SSTs from human services. Therefore, this study compensates academic research on customer adoption of SST and fills a research void on organizational adoption by emphasizing the influences of human services and exploring SST adoption in a multi-channel context, instead of exclusively focusing on customers' "intention to use" SST (Eriksson and Nilsson 2007; Gelderman et al. 2011).

Besides, this study verifies the usefulness of reference-independent preference in qualitative tourism and hospitality research. Reference-independent preference is a famous theory in behavioral economics but has rarely been used in tourism and hospitality, particularly in qualitative studies. Therefore, this exploratory study contributes to the applicability, generalization, and richness of the theory from an organizational standpoint (i.e., hotels).

Third, the identified dynamic feature of SST benefits provide support for the usefulness of technology affordances and constraints theory (Majchrzak and Markus 2012). The concept of affordance emphasizes the dynamic interaction between technology and users, thus overcoming the limitations of theories that concentrate exclusively on psychological or social behavior (Majchrzak and Markus 2012). Similarly, this study found that SST benefits are not stable but dynamic and related to the characteristics of SST, users (hotels), end users (customers), and alternatives (service employees). Thus, this study backs up the technology affordances and constraints theory.

Last but not the least, this study confirms the statement that it appears inappropriate to use a single theory to fully explain organizational innovation adoption (Brancheau and Wetherbe 1990). Instead, it underscores the necessity of integrating reference-independent preference and technology affordances and constraints theory to explore SST adoption."

5.2 Practical Implications

Our results also offer constructive practical implications. First, armed with these findings, hotel practitioners can make more rational decisions when introducing SSTs rather than blindly trusting its benefits, which are often exaggerated in the media. Our findings indicate service employee may transform SST merits into disadvantages. Therefore, it is possible that SST implementation in a hotel end with failure, albeit it is useful. The reason may lie in that the human services of this hotel are more useful than SSTs. Instead, if the service employees in a hotel is helpless, its application of SSTs will move towards successful. That is, SSTs may benefit a hotel, while damaging another, depending on the traditional human services. Thus, hotel practitioners are suggested to carefully evaluate their own condition, human service quality and target customers when making decisions on SST investment, as the benefits of SSTs are dynamic and can be transformed to negative influences, depending on its users (hotels), end users (customers) and alternative (service employees).

Second, the development of SSTs is too fast to keep hotels from updating their knowledge in time. In this study, the up-to-date and integrated information of the dis/advantages of SSTs compared with human services in hotels are gained through the participation of hoteliers and customers from diverse hotels. The latest and integrated information enhances and updates practitioners' knowledge of SSTs in time. With a good understanding of SSTs in comparison with human services, hotels can reach more successful SST implementation and avoid failure.

Third, better strategies can be wielded to manage and deploy multiple channels. Effective management of service delivery channels increases a hotel's likelihood of being profitable and successful amidst a growing competitive marketplace (Meuter et al. 2000). In this respect, money and time can be allocated efficiently, and customer relationships and loyalty can be elevated to promote future success. Specifically, this research offers insights into how different service channels excel in specific hotels for specific customers. Findings can help managers choose the most suitable channels for their respective customers. For instance, SSTs and service employees excel in different dimensions of the customer experience. Practitioners can provide the suitable service delivery channel according to the experience they wish to provide customers, and the experience customers want to achieve.

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All in all, hotels should consider their own and customers' dynamic interactions with SST and service employees when making decisions regarding SST use, rather than blindly trusting plausible media hype or investing SSTs (Majchrzak and Markus, 2012).

6   Conclusion

We have proposed a conceptual framework comparing SST and service employees on seven dimensions along with their influences on hotel's and customers' preference for SSTs (Figure 1). Specifically, SST devices were found to be preferable to service employees in terms of cost savings, less deviation in service quality, and high-tech customer experiences, all of which encourage SST adoption. On the contrary, SST devices underperformed compared to service staff with respect to communication, ease of use, usefulness, and high-touch services, leading to a preference for human services. Notably, these SST benefits and disadvantages are dynamic and related to users (hotels), end users (customers), and alternatives (service employees). This comparative framework enhances our knowledge of the influences of human services on SST adoption. A clear comparison of SST and human services can also guide hoteliers' decisions about SST investment and service channel management.

Despite its revelations, this study has two limitations. First, although a mixed qualitative method was adopted, quantitative studies should be conducted in the future to examine the generalizability of the proposed conceptual framework. In addition, because this study was conducted in the hotel industry in China, additional research should involve cross-cultural and cross-contextual perspectives.

References

Ba S, Stallaert J, Zhang Z (2010) Balancing IT with the human touch: Optimal investment in IT-based customer service. Information Systems Research 21:423–442.

Beatson A, Coote L V, Rudd JM (2006) Determining consumer satisfaction and commitment through self-service technology and personal service usage. Journal of Marketing Management 22:853–882

Bitner MJ, Booms BH, Tetreault MS (1990) The service encounter: Diagnosing favorable and unfavorable incidents. Journal of Marketing 54:71–84

Brancheau JC, Wetherbe JC (1990) The adoption of spreadsheet software: Testing innovation diffusion theory in the context of end-user computing. Information systems research 1:115–143

Considine E, Cormican K (2016) Self-service technology adoption: An analysis of customer to technology interactions. Procedia Computer Science 100:103–109.

Creswell JW, Clark VLP (2007) Designing and conducting mixed methods research. SAGE Publications, Thousand Oaks, Calif.

Edmunds H (1999) The focus group research handbook. Lincolnwood, Ill: NTC Business Books, U.S.A.

Eriksson K, Nilsson D (2007) Determinants of the continued use of self-service technology: The case of Internet banking. Technovation 27:159–167.

Gelderman CJ, Ghijsen PWT, van Diemen R (2011) Choosing self-service technologies or interpersonal services—The impact of situational factors and technology-related attitudes. Journal of Retailing and Consumer Services 18:414–421.

Giebelhausen M, Robinson SG, Sirianni NJ, Brady MK (2014) Touch versus tech: When technology functions as a barrier or a benefit to service encounters. Journal of Marketing 78:113–124

Hanks L, Line ND, Mattila AS (2016) The Impact of self-service technology and the presence of others on cause-related marketing programs in restaurants. Journal of Hospitality Marketing and Management 25:547–562.

Harding J (2013) Qualitative data analysis from start to finish. SAGE, London

Hertzfeld, E. (2018) Facial recognition check-in rolled out at 50 hotels in China. Retrieved from https://www.hotelmanagement.net/tech/facial-recognition-check-rolled-out-at-50-hotels-china

Hilton T, Hughes T, Little E, Marandi E (2013) Adopting self-service technology to do more with less. Journal of Services Marketing 27:3–12

Holsti OR (1969) Content analysis for the social sciences and humanities. Addison-Wesley., Reading, Mass.

Johnson B, Turner LA (2003) Data collection strategies in mixed methods research. In: Teddlie C, Tashakkori A (eds) Handbook of mixed methods in social & behavioral research. SAGE Publications, Thousand Oaks, Calif., pp 297–319

Kahneman D, Tversky A (1979) Prospect theory: An analysis of decision under risk. Econometrica 47:263–291

Karadag E, Dumanoglu S (2009) The productivity and competency of information technology in upscale hotels. International Journal of Contemporary Hospitality Management 21:479–490.

Kasavana ML (2008) The convergence of self-service technology. Hospitality Upgrade Magazine 122–128

Kaushik AK, Agrawal AK, Rahman Z (2015) Tourist behavior towards self-service hotel technology adoption: Trust and subjective norm as key antecedents. Tourism Management Perspectives 16:278–289

Kelly P, Lawlor J, Mulvey M (2017) Customer roles in self-service technology encounters in a tourism context. Journal of Travel & Tourism Marketing 34:222–238.

Kim M, Qu H (2014) Travelers' behavioral intention toward hotel self-service kiosks usage. International Journal of Contemporary Hospitality Management 26:225–245

Kokkinou A, Cranage DA (2015) Why wait? Impact of waiting lines on self-service technology use. International Journal of Contemporary Hospitality Management 27:1181–1197

Kokkinou A, Cranage DA (2013) Using self-service technology to reduce customer waiting times. International Journal of Hospitality Management 33:435–445.

Kucukusta D, Heung V, Hui S (2014) Deploying self-service technology in luxury hotel brands: Perceptions of business travelers. Journal of Travel & Tourism Marketing 31:55–70.

Lee H-J, Yang K (2013) Interpersonal service quality, self-service technology (SST) service quality, and retail patronage. Journal of Retailing and Consumer Services 20:51–57.

Lee LY-S (2016) Hospitality industry web-based self-service technology adoption model. Journal of Hospitality & Tourism Research 40:162–197

Lema JD (2009) Preparing hospitality organizations for self-service technology. Journal of Human Resources in Hospitality & Tourism 8:153–169

Majchrzak A, Markus ML (2012) Technology affordances and constraints in management information systems (MIS). In: Kessler E (ed) Encyclopedia of Management Theory. Sage Publications, Thouasand Oaks, Calif., pp 832–836

Meuter ML, Bitner MJ, Ostrom AL, Brown SW (2005) Choosing among alternative service delivery modes: An investigation of customer trial of self-service technologies. Journal of Marketing 69:61–83

Meuter ML, Ostrom AL, Bitner MJ, Roundtree R (2003) The influence of technology anxiety on consumer use and experiences with self-service technologies. Journal of Business Research 56:899–906.

Meuter ML, Ostrom AL, Roundtree RI, Bitner MJ (2000) Self-service technologies: Understanding customer satisfaction with technology-based service encounters. Journal of Marketing 64:50–64

Morris A (2015) A practical introduction to in-depth interviewing. SAGE, London

Oh H, Jeong M, Baloglu S (2013) Tourists' adoption of self-service technologies at resort hotels. Journal of Business Research 66:692–699

Oh H, Jeong M, Lee S, Warnick R (2016) Attitudinal and situational determinants of self-service technology use. Journal of Hospitality & Tourism Research 40:236–265.

Ozturk AB, Hancer M (2014) Hotel and IT decision-maker characteristics and information technology adoption relationship in the hotel industry. Journal of Hospitality and Tourism Technology 5:194–206.

Panda AK, Dash SK, Rath PK (2011) An investigation of reasons affecting customer adoption and rejection of technology based self service (TBSS) on consumer satisfaction and consumer commitment. BVIMR Management Edge 4:100–104

Prothro, J. W (1956) Verbal shifts in the American presidency: A content analysis. American Political Science Review, 50(3): 726–739.

Pieterson W, Ebbers W (2008) The use of service channels by citizens in the Netherlands: Implications for multi-channel management. International Review of Administrative Sciences 74:95–110

Rosenbaum MS, Wong IA (2015) If you install it, will they use it? Understanding why hospitality customers take "technological pauses" from self-service technology. Journal of Business Research 68:1862–1868

Schumann JH, Wünderlich N V, Wangenheim F (2012) Technology mediation in service delivery: A new typology and an agenda for managers and academics. Technovation 32:133–143.

Selnes F, Hansen H (2001) The potential hazard of self-service in developing customer loyalty. Journal of Service Research 4:79–90

Shin H, Perdue RR (2019) Self-Service Technology Research: A bibliometric co-citation visualization analysis. International Journal of Hospitality Management 80:101–112.

Sousa R, Voss CA (2006) Service quality in multichannel services employing virtual channels. Journal of Service Research 8:356–371

Stoshikj M, Kryvinska N, Strauss C (2016) Service systems and service innovation: Two pillars of service science. Procedia Computer Science 83:212–220

Veal AJ (2011) Research methods for leisure and tourism: A practical guide, 4th edn. Pearson Education, England

Waller V, Farquharson K, Dempsey D (2016) Qualitative social research: Contemporary methods for the digital age. SAGE, London

Wang C, Harris J, Patterson PG (2012) Customer choice of self-service technology: The roles of situational influences and past experience. Journal of Service Management 23:54–78

Wang G, Wang J, Ma X, Qiu RG (2010) The effect of standardization and customization on service satisfaction. Journal of Service Science 2:1–23

Wei W, Torres E, Hua N (2016) Improving consumer commitment through the integration of self-service technologies: A transcendent consumer experience perspective. International Journal of Hospitality Management

Wei W, Torres EN, Hua N (2017) The power of self-service technologies in creating transcendent service experiences. International Journal of Contemporary Hospitality Management 29:1599–1618

Wilkinson S (2011) Analysing focus group data. In: Silverman D (ed) Qualitative research, 4th edn. SAGE, London, pp 83–98

Willis J (2007) Foundations of qualitative research: Interpretive and critical approaches. Sage Publications, Thousand Oaks

Yadegaridehkordi E, Nilashi M, Nasir MHNBM, Ibrahim O (2018) Predicting determinants of hotel success and development using Structural Equation Modelling (SEM)-ANFIS method. Tourism Management 66:364–386.

Zhang C, Dhaliwal J (2009) An investigation of resource-based and institutional theoretic factors in technology adoption for operations and supply chain management. International Journal of Production Economics 120:252–269.

Table 1. Demographics of Focus Group Discussion Participants

Group number	Gender	Age	Position	Years of working experience	Type of organization
Group 1					
Informant 1	Female	31	Assistant human resources manager	10	Luxury hotel
Informant 2	Female	45	Finance director	22	Luxury hotel
Informant 3	Male	42	Vice general manager	20	Luxury hotel
Informant 4	Female	29	Front office manager	9	Luxury hotel
Informant 5	Female	44	Operation director & executive assistant	15	Luxury hotel
Informant 6	Female	42	General manager	20	Hotel Group
Informant 7	Male	30	Administrative director	4	Hotel Group
Group2					
Informant 1	Male	40	General manager	20	Luxury hotel
Informant 2	Female	31	Finance manager	8	Owner Company
Informant 3	Male	32	Director of sales & marketing	10	Luxury hotel
Informant 4	Female	39	Project manger	15	Hotel Group
Informant 5	Male	32	Owners' representative	8	Owner Company
Informant 6	Female	32	Learning and development manager	11	Luxury hotel
Informant 7	Female	36	Owners' representative	13	Hotel Group
Group 3					
Informant 1	Female	46	General Manager	20	NA
Informant 2	Male	33	Front office manager	13	Upscale hotel
Informant 3	Male	39	Vice president	18	Group
Informant 4	Male	34	Purchasing manager	9	Owner Company
Informant 5	Female	40	Finance director	20	Luxury hotel
Informant 6	Female	33	Training manager	8	NA
Group 4					
Informant 1	Female	38	Director of human resources	20	Hotel Group
Informant 2	Female	30	Senior administration manager	7	Hotel Group
Informant 3	Male	44	Executive vice president	20	Hotel Group
Informant 4	Female	31	Accounting manager	9	Luxury hotel
Informant 5	Female	35	Sales director	13	Luxury hotel
Informant 6	Female	30	Senior purchasing manager	8	Owner Company

NA means the informant did not indicate the organization where he/she works.

Table 2. Demographics of In-depth Interview Participants (Hotel Managers and Customers)

Informant No.	Age	Gender	Position	Hotel Scale	Informant No.	Age	Gender	Hotel Scale
Manager #1	36	Female	Assistant Front Office Manager	Upscale	Customer #1	25	Female	Economy
Manager #2	29	Female	Front Office Manager	Luxury	Customer #2	25	Female	Upscale
Manager #3	36	Female	Information Technology Manager	Luxury	Customer #3	28	Male	Economy
Manager #4	46	Male	General Manager	Luxury	Customer #4	27	Female	Economy
Manager #5	28	Male	Hotel manager	Midscale	Customer #5	29	Male	Upscale
Manager #6	37	Male	Chief Information Officer	Upscale	Customer #6	27	Male	Upscale
Manager #7	36	Female	Director of Human Resources	Luxury	Customer #7	24	Male	Upscale
Manager #8	36	Male	Marketing Director	Upscale	Customer #8	27	Female	Upscale
Manager #9	29	Male	Public Relations Specialist	Upscale	Customer #9	28	Female	Luxury
Manager #10	28	Female	Public Relations Manager	Luxury	Customer #10	27	Female	Upscale
Manager #11	33	Male	Director of Human Resources	Luxury	Customer #11	28	Female	Luxury
Manager #12	29	Male	Front Office & Sales Department Manager	Economy	Customer #12	35	Female	Upscale
Manager #13	36	Male	Sales Department Manager	Luxury	Customer #13	35	Female	Luxury
Manager #14	43	Male	General Manager	Upscale	Customer #14	29	Female	Luxury
Manager #15	37	Male	General Manager	Luxury	Customer #15	26	Female	Midscale
Manager #16	38	Male	General Manager	Luxury	Customer #16	28	Female	Luxury
Manager #17	30	Male	Information System Manager	Upscale	Customer #17	28	Female	Upscale
Manager #18	39	Male	General Manager	Upscale	Customer #18	30	Female	Midscale
Manager #19	40	Female	Director of Human Resources	Luxury	Customer #19	30	Female	Luxury
Manager #20	56	Male	General Manager	Luxury	Customer #20	25	Female	Midscale
Manager #21	40	Female	Housekeeper	Luxury	Customer #21	30	Male	Upscale

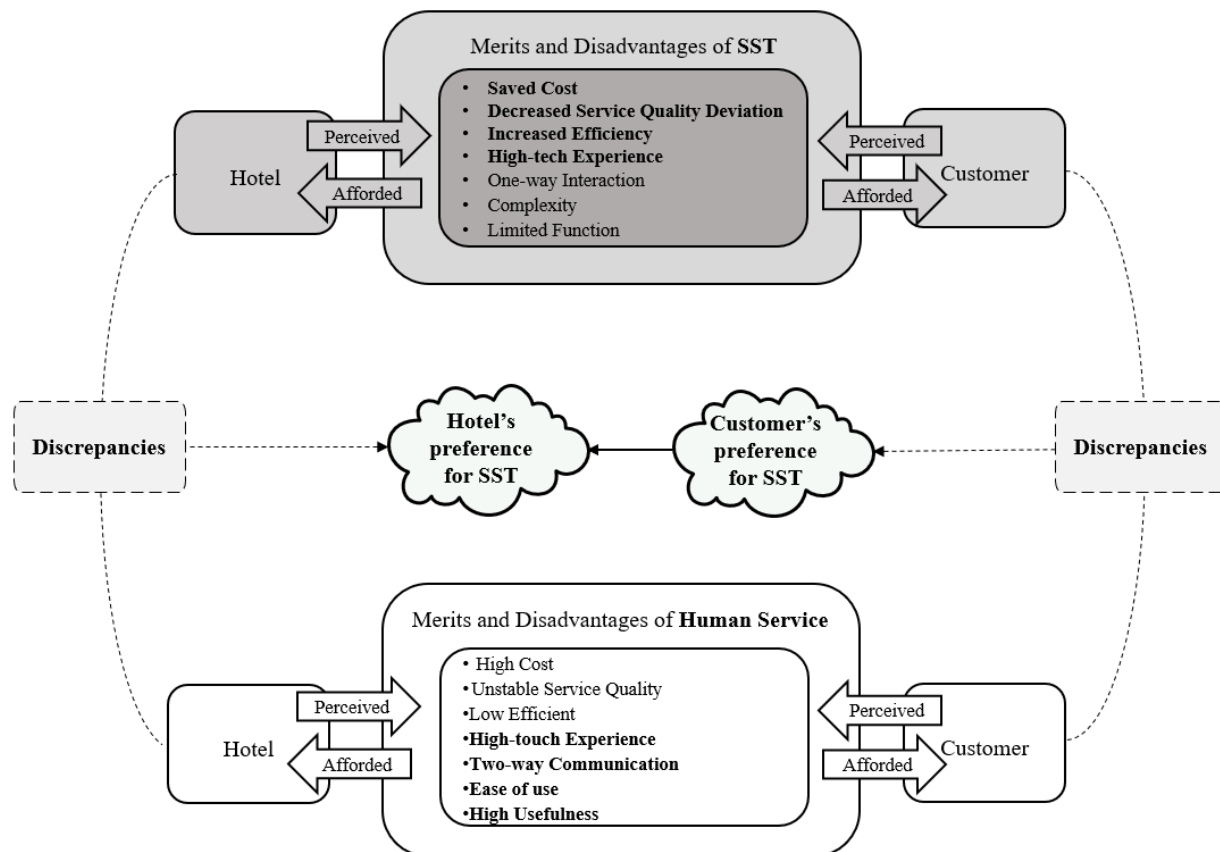|								
Manager #22	40	Male	Group Marketing Director	Luxury	Customer #22	27	Male	Midscale
Manager #23	38	Female	General Manager	Luxury	Customer #23	42	Male	Economy
Manager #24	48	Male	General Manager	Upscale	Customer #24	52	Female	Economy
Manager #25	46	Male	Vice Manager of Group	Luxury	Customer #25	30	Male	Luxury
Manager #26	33	Male	Temporary General Manager	Upscale	Customer #26	27	Male	Economy
Manager #27	50	Male	General Manager	Upscale	Customer #27	27	Male	Luxury
Manager #28	45	Male	General Manager	Upscale	Customer #28	55	Male	Luxury
Manager #29	38	Male	General Manager	Upscale	Customer #29	31	Female	Midscale
Manager #30	34	Male	General Manager	Upscale	Customer #30	8	Male	Midscale

Fig. 1. A comparative framework of self-service technology with service employee