The Influence of Hotel Service with the Participation of AI on Customer Purchase Intention

Xiaoqing Liu(✉)

Shanghai University, 20 Chengzhong Road, Jiading District, Shanghai 201800, China
liuxiaoqing2618@163.com

Abstract. Artificial intelligence provides technical guarantee for the improvement of hotel service capability, but it contradicts the original intention of providing customers with a sense of warmth. Based on Markov decision process and questionnaire survey, this study explores the internal mechanism of the relationship between hotel service mode and customer purchase intention under human-computer interaction, and analyzes the differential influence of artificial intelligence participation degree on consumers with different motivations. The experimental results show that 1) there is an inverted U-shaped effect between hotel service pattern and customers' purchase intention, 2) perceived warmth plays a driving role, 3) customer motivation has an impact on customers' perceived warmth and purchase intention. This study provides effective guidance for hotels to choose appropriate service modes for different customers in the era of artificial intelligence.

Keywords: smart hotel · service mode · artificial intelligence

1 Introduction

With the rapid development of modern information technology, smart hotels supported by emerging technologies such as big data, Internet and artificial intelligence (hereinafter referred to as AI) have realized intelligent management and services. This not only meets the fast-paced work needs of today's society, but also meets consumers' demand for high-tech experience. As a machine to achieve instrumental and utilitarian goals through programming and design, AI provides technical support for the improvement of hotel service ability. But the AI service is in contradiction with the original intention of the hotel to provide customers with a sense of warmth. How to apply AI technology to meet the needs of customers to perceive warmth and stimulate customers purchase intention is the key issue for the sustainable and healthy development of smart hotels in the future.

The essence of artificial intelligence service is the process of human-computer interaction between customers and service robots. Human-computer interaction experience is the key to the sustainable development of intelligent hotels. Most of the existing

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researches focus on the design, architecture and performance of robots from the perspective of engineering, rather than the use experience of robots from the perspective of social humanities, but human-computer interaction and service experience are highly relevant. In view of this, it is necessary to explore the application of intelligent robots in hotels and customers' perception and experience of service robots from the perspective of human-computer interaction [1]. The limited research in the field of human-computer interaction is mainly to explore the impact of service robots from the perspective of functions, and the lack of research on social experience on customer purchase intention [2]. Therefore, this study starts from the participation of artificial intelligence to explore the influence and internal mechanism on customer purchase intention of manual service mode, human-robot cooperation service mode (hereinafter referred to as HRC) and unmanned service mode.

2 Theoretical Analysis and Research Hypothesis

2.1 The Effect of Service Modes on Customer Purchase Intention

The purchase intention of customers is generated through the perception of service value, and the participation degree of AI in different service modes is an important stimulus factor affecting the perception of service value of customers. Therefore, the services provided by human service personnel may have an impact on customers purchase intention. Although AI technologies in the service sector are still in their infancy, they have unique value in the eyes of consumers, which distinguishes them from traditional technologies. For example, Bellis and Johar [3] found that consumer motivations for adopting intelligent systems include functional advantages, time and cost saving, as well as ease of use and convenience. However, a high degree of AI involvement may have a negative impact on customer attitudes, such as a lack of compassion and empathy in AI, and an excessive sense of discomfort in anthropomorphic robots. Accordingly, this study proposes the following hypotheses:

H1: There is an inverted U-shaped relationship between service mode and customer purchase intention; compared with manual service mode and unmanned service mode, customer purchase intention is stronger under HRC service mode.

2.2 The Moderating Effect of Customer Motivation

The cognition, behavior and results of customers in hotel service are affected by motivation. Motivation acts as the psychological process that guides, motivates and maintains individual behaviors, subconsciously driving customer participation [4]. Motivation can be divided into hedonic motivation and utilitarian motivation based on different internal and external perspectives. Utilitarian motivation is the motivation guided by functional advantages and disadvantages. For example, the behavior and evaluation of customers who choose to stay in a hotel for business travel are mostly in line with utilitarian motivation. Hedonic motivation is the motivation guided by the advantages and disadvantages of experience, and its needs are more perceptual. For example, the consumption behavior and evaluation of leisure holiday guests are generally in line with hedonic motivation.

Different customer motivation may make customers have different purchase intention for a certain service model. Ding and Keh [5] found that consumers with hedonic motivation prefer customized services, while consumers with utilitarian motivation prefer standardized services. Accordingly, this study proposes the following hypotheses:

H2. Customer motivation plays a moderating role in the relationship between service mode and customer purchase intention. Compared with utilitarian motive, hedonic motive customers have a higher level of purchase intention under manual service mode. Compared with hedonic motive, utilitarian motive customers have a higher level of purchase intention under unmanned service mode.

2.3 The Mediating Role of Perceived Warmth

The essence of artificial intelligence service is the process of human-computer interaction between customers and service robots. Chen [6] designed an emotion regulation robot based on multi-weight Markov, which can effectively help users to reduce the sense of distance from users and minimize the service consumption and steps of the robot [7].

A matchable method of solving human-robot interaction is Reinforcement Learning. Markov Decision Process (MDP) is specified by the tuple (S, A, T, d, R). S is the states set and A is the actions set [8]. T is a transition function, T: $S * A * S \rightarrow R$, which gives the probability, from a state st with an action at to a new state st + 1. The discount factor d, exponentially decreases the value of a future reward to limit the action steps. To maximize the reward R, R: $S * A * S \rightarrow R$, is part of the goal for the process [9]. Reward is considered as a function of only st and at, which is

$$r(s,a) = E\left[R_{t+1}|S_t = s, A_t = a\right] = \sum\nolimits_{r\in R} r \sum\nolimits_{s\in S} p(s^{'}, r|s, a) \tag{1}$$

For any policy π and any states, the following consistency condition holds between the value of s and the value of its possible successor states:

$$v_\pi(s) = \sum\nolimits_a \pi(a|s) \sum\nolimits_{s^{'},r} p\left(s^{'}, r|s, a\right)[r + \gamma v_\pi(s^{'})] \tag{2}$$

Under the framework of Markov decision process, scholars propose that the actions taken by service robots are collected from the emotion-regulating strategies of external stimuli. As one of external stimuli, perceived warmth plays an important role in human-computer interaction. The popularity of HRC service model and unmanned service model makes the "warm source" of "human" gradually replaced by service machine [10]. Machines are considered mechanized, programmed and cold in the customer's mind because they do not have enough compassion and understanding to truly care for the customer. Therefore, hotels using the traditional manual service model will perform better in the warmth dimension. Accordingly, this study proposes the following hypotheses:

H3: The moderating effect of customer motivation on the relationship between service mode and customer purchase intention is realized through the intermediary of perceived warmth: compared with HRC service mode and unmanned service mode, the perceived warmth level of manual service mode is higher, which further affects their purchase intention (Fig. 1).

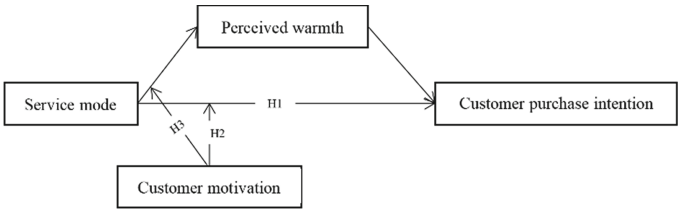

Fig. 1. Theoretical model

Fig. 2. Hotel service scene

3 Experimental Design and Result Analysis

3.1 Experimental Design

In order to demonstrate the effectiveness of the service model and customer motivation manipulation, this study recruited 48 school students to rate the degree of AI engagement in three different service models as shown in Fig. 2 and answer questions related to customer motivation before the formal experiment. The picture of the experiment scene is selected from Hilton International Hotel, and the picture of the service staff is selected from the photo network. The results show that the scores of the three service modes from high to low are respectively MH = 5.84, MM = 3.50, ML = 2.90, $p < 0.001$. The results of different service modes were not significantly different, which proved that the subjects were able to imagine the motivation of the customers they represented, and the manipulation was effective.

3.2 Experimental Procedures

The experiment uses 3 (manual service vs. human-robot collaboration vs. unmanned service) × 2 (hedonic motivation vs. utilitarian motivation) intergroup experiment. The 360 students were randomly assigned to one of six experimental situations, and each received a questionnaire manual. The manual started with trial-irrelevant questions and then manipulated the customer motivation of the subjects. Then, the subjects were asked to describe their imagined service scenario in as much detail as possible after seeing the pictures and scene descriptions. Based on their assumptions, they answered the questions about the degree of AI participation and purchase intention. Finally, the questions about perceived warmth and demographic characteristics were investigated. The experiment finally received 355 valid questionnaires.

3.3 Measure

The questionnaire included measures of service mode (AI participation level was selected for ease of measurement), customer purchase intention, customer motivation and perceived warmth. According to the summary of the development trend of the industry, the service mode is scored according to the participation degree of AI technology. The larger the number from 1 to 7, the higher the degree. The measurement of customers' purchase intention is based on the three questions of Schiffman et al. (2000). The measurement items of perceived warmth refer to the Maturity scale of Fiske et al. (2002). Customer motivation refers to the scale of Huta (2016) and is revised according to the specific situation of the hotel.

3.4 Results and Discussion

In view of the relationship between service mode and customer purchase intention, first, one-way ANOVA of variance was used to test the subjects' perception of the participation degree of AI ($MH = 4.31$, $SD = 1.40$, $MM = 3.16$, $SD = 0.93$, $ML = 2.68$, $SD = 0.89$, $F = 69.84$, $p < 0.001$). The results show that service mode manipulation is effective. Gender ($p = 0.12$), age ($p = 0.14$) and education level ($p = 0.22$) had no significant effect on the intention to use, so they were not included in subsequent statistical analysis. Then, the standardized purchase intention, AI participation degree and the square of AI participation degree were added into the regression equation of purchase intention. The square term coefficient was -0.08, which was significantly negative ($p < 0.05$), indicating that the service mode and customer purchase intention presented an inverted U-shaped relationship, supporting hypothesis 1. Specifically, the relationship between service mode and customer purchase intention is shown in Fig. 3.

In view of the moderating effect of customer motivation, this study found that customer motivation moderated the effect of service mode on customer purchase intention through two-way ANOVA ($p < 0.05$). As can be seen from Fig. 4, for the manual service model, customers with hedonic motivation have higher purchase intention. For HRC service model, there is no significant difference between the two kinds of customer

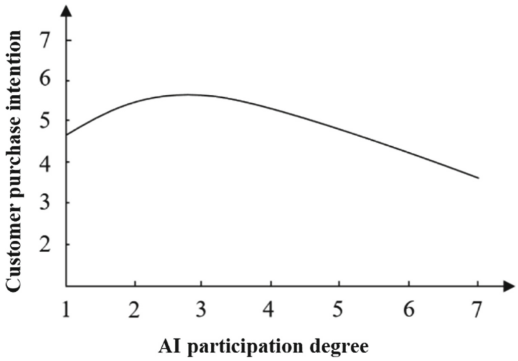

Fig. 3. The inverted U-shaped relationship between AI participation degree and customer purchase intention

motivation. For the unmanned service model, customers with utilitarian motivation have higher purchase intention, supporting hypothesis 2. Similarly, customer motivation moderated the effect of service mode on perceived warmth ($p < 0.01$). As shown in Fig. 5, the perceived warmth level of hedonic motivated customers decreases with the increase of AI participation. However, the level of customers' perceived warmth with utilitarian motivation increases with the increase of AI participation, supporting hypothesis 3.

Process software (Model 8) was used to test the mediation model. As can be seen from Table 1, when the participation degree of AI in the service mode is low, its prediction effect on perceived warmth is not significant ($\beta = -0.277$, $p = 0.204 > 0.05$). The product term of AI involvement and customer motivation also had no significant predictive effect on perceived warmth ($\beta = -0.467$, $p = 0.112 > 0.05$). When the degree of AI participation in service mode was higher, it had a significant predictive effect on perceived warmth ($\beta = -0.786$, $p < 0.01$). The product term of AI involvement and customer motivation was also significant in predicting perceived warmth ($\beta = 1.297$, $p < 0.01$). After the inclusion of perceived warmth in the model, the main effect of AI on customer purchase intention was significant when the degree of AI participation in service mode was low ($\beta = 0.773$, $p < 0.01$). However, when the degree of AI participation was higher, the prediction effect of AI on customer usage intention was not significant $\beta = 0.279$, $p = 0.25 > 0.05$). The relationship between perceived warmth and customer intention was significant ($\beta = 0.670$, $p < 0.01$), while the relationship between service mode and customer motivation was not significant ($\beta_1 = -0.232$, $p_1 = 0.51$, $\beta_2 = -0.320$, $p_2 = 0.36$). This verifies the mediation model.

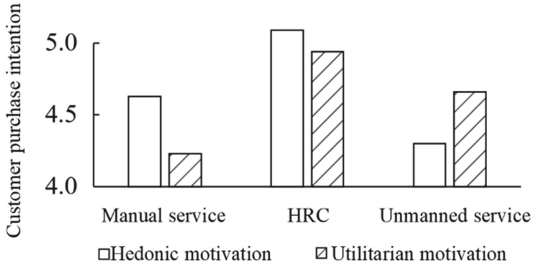

Fig. 4. Customer motivation to service mode and the customer purchase intention

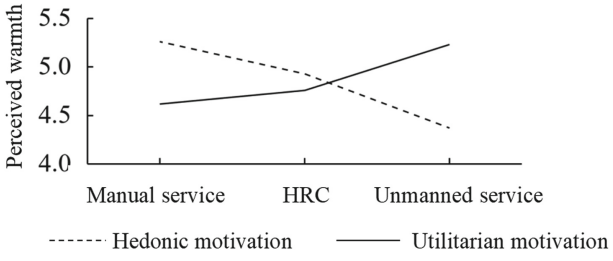

Fig. 5. Customer motivation to service mode and perceived warmth

Table 1. Tests the mediation model

	Perceived warmth		Customer purchase intention	
	β	t	β	t
X_1 (HRC vs. Manual service)	−0.277	−1.274	0.773	2.993***
X_2 (HRC vs. Unmanned service)	−0.786	−3.931***	0.279	1.151
Perceived warmth	——	——	0.670	10.503***
Customer motivation	−0.571	−2.674***	0.150	0.586
X_1 (HRC vs. Manual service)*Customer motivation	0.467	1.592	−0.232	−0.665
X_2 (HRC vs. Unmanned service)*Customer motivation	1.297	4.575***	−0.320	−0.947
Actual income	0.027	0.573	0.052	0.947
Actual level of education	−0.028	−0.522	0.069	1.078
R^2	0.120		0.300	
F	4.677***		13.33***	

It can be seen from Table 2 that when the degree of AI participation in service mode is low, the direct effect of customer motivation on service mode and customer purchase intention is significant ($\beta1 = 0.773$, $\beta2 = 0.541$, CI not including 0). However, when the degree of AI participation in service mode was high, the direct effect was not significant ($\beta3 = 0.279$, $\beta4 = -0.041$, CI included 0). On the contrary, when the degree of AI participation in service mode was low, the indirect effect of customer motivation on service mode and customer purchase intention was not significant ($\beta1 = -0.186$, $\beta2 = 0.127$, CI included 0). However, when the degree of AI participation in service mode is high, the indirect effect is significant ($\beta3 = -0.527$, $\beta4 = -0.342$, CI is not included 0). Therefore, customer motivation not only moderates the main effect of AI participation degree of service mode on customer purchase intention, but also moderates the effect of service mode on the intermediary of perceived warmth, thus affecting customer purchase intention, hypothesis 2 and hypothesis 3 are supported.

4 Discussion

Through experiments, this paper illustrates two research questions: First, the influence of service mode and customer purchase intention: with the increase of AI participation in service mode, customer purchase intention will first increase and then start to decline, that is, there is an inverted U-shaped influence relationship between the two. Secondly, through the establishment of mediation model, we explore how customer motivation constitutes the boundary conditions of the above influence.

Table 2. Direct and mediating effects under different customer motivations

		Customer motivation	Effect value	Standard error	t	Bootstrap95%CI	
						Upper limit	Lower limit
Direct effect	X_1(HRC vs. Manual service)	Hedonic motivation	0.773	0.258	2.993***	0.265	1.281
		Utilitarian motivation	0.541	0.244	2.215***	0.061	1.022
	X_2(HRC vs. Unmanned service)	Hedonic motivation	0.279	0.242	1.151	−0.197	0.754
		Utilitarian motivation	−0.041	0.237	−0.174	−0.508	0.426
Indirect effect	X_1(HRC vs. Manual service)	Hedonic motivation	−0.186	0.122		−0.440	0.040
		Utilitarian motivation	0.127	0.131		−0.127	0.384
	X_2(HRC vs. Unmanned service)	Hedonic motivation	−0.527	0.129		−0.794	−0.286
		Utilitarian motivation	0.342	0.148		0.065	0.654

The results show that customer motivation has a moderating effect on the relationship between service mode and customer purchase intention: customers with hedonic motivation have a higher purchase intention for hotel services in the manual service mode, while customers with utilitarian mode have a higher purchase intention for hotel services in the unmanned service mode. The moderating effect of customer motivation on the relationship between service mode and customer purchase intention is also realized through the mediating effect of perceived warmth. With the increase of AI participation in the service mode, the perceived warmth level of hedonic motivated customers gradually decreases, while that of utilitarian motivated customers gradually increases, thus affecting their purchase intention. These conclusions enrich the hotel industry AI related research and provide theoretical support at the hotel strategy level.

This paper has important reference value for the practical application of hotel AI in marketing. Firstly, in the era of AI, more and more enterprises introduce AI to provide services for consumers. However, if the improper use will also bring losses to the enterprise. Therefore, enterprises should not blindly pursue technological experience when introducing AI. Secondly, this study finds that enterprises should be customer-oriented, through identifying their own positioning and consumer types, choose the service mode that matches consumer preferences. Finally, enterprises should pay enough attention to the participation degree of AI and its influence on the perceived warmth of different types of consumers, so that customers of various motivations can feel the ability of AI

to provide good service in the process of interacting with AI, while retaining the warm feeling of home in the traditional hotel industry.

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