

Research Status and Thinking of Service Failure and Service Recovery of Service Robot

Fangmin Sun*

School of Economics and Management, Tianjin University of Technology and Education, Tianjin 300222, China

* Corresponding author: Sun Fangmin (Email: 15169821303@163.com)

Abstract: With the development of intelligent technology, service robots have appeared in various service first-line environments, and consumers will inevitably encounter service failure of service robots. This paper analyzes the types of service failure by combing the relevant literature on service failure and service recovery, and based on the social cognitive theory, clarifies the remedial measures that should be taken after service robot fails. It is found that after process failure, the service robot makes emotional response such as apology or empathy, the service recovery effect is better; When the result fails, the service robot makes rational response such as explanation, the consumer's attitude is more positive. The research results provide practical enlightenment for enterprises to carry out service recovery.

Keywords: Failure type; Service recovery; Service robot; Social cognition.

1. Introduction

Intelligent service robot is an important embodiment of artificial intelligence, with the rapid development of artificial intelligence technology, it has been widely used in restaurants, hotels, express delivery and medical service environment, service robots replace human employees in the front line service, face-to-face communication with humans. The common service robots mainly include food delivery robots, navigation robots, distribution robots, and guidance robots. Due to its advantages of improving service efficiency, optimizing service quality and reducing labor costs, enterprises have introduced service robots to replace human employees, and even hotels that fully use service robots have appeared.

In the context of service robots being widely used in frontline environments, service failures will inevitably occur. For example, Churi, a service robot at the Henn-Na hotel in Japan, sees guests' snoring as a distress signal and wakes them up several times during the night[1]. Service failure can lead to negative emotions, such as frustration, anger, disgust and disappointment, and even complaints or outright abandonment of service robots[2-3]. Service robots need to accumulate various human-machine interaction data from service practice and constantly learn from it to improve their intelligence level. Consumers' disgust and rejection of service robot after service failure will hinder the application and development of intelligent service robot.

Studies have shown that remedial measures such as apology or explanation by service robots or human employees can help to restore consumers' dissatisfaction with robot failure and change consumers' behavioral willingness[4-6]. However, in the intelligent service environment, service robots may fail in different degrees, and some may cause irreparable losses to consumers. For example, Xue Zhe et al (2023) found that the severity of service failure of robots will affect customers' willingness to continue using them[6]. For more serious service failures, there is a lack of systematic thinking about the effectiveness of remedies for apologies and explanations. How effective apologies, explanations, and other remedies are for service failures of varying severity has

not been effectively answered. Therefore, through literature analysis, this study sorts out the existing research on the types of service failure and service remedy, and focuses on and considers the effects of various remedial measures on different severity of service failure and the impact on consumers' switching behavior intention.

2. Theoretical Background

2.1. Service robots

Service robots are different from industrial robots with the "highest" level of intelligence and are able to provide consumers with social and emotional interaction services, such as chatbots that communicate with customers[7]. According to the different level of intelligence of service robots, service robots can present different degrees of automated social existence, so as to help customers feel the existence of another social entity. For example, consumers tend to perceive service robots with a higher degree of anthropomorphism as warmer, more intimate, and more friend-like[8].

The service robot acceptance model suggests that consumer acceptance of a robot depends not only on functional elements (e.g., perceived usefulness and ease of use), but also on social-emotional and relational elements[9]. Previous research has pointed to the importance of both in several ways. Firstly, the level of anthropomorphism in the appearance and behavior of service robots can affect consumers' attitude and interaction intention[10]. Robots with a higher level of anthropomorphism also have a higher consumer perception of their mind and warmth. Second, service robots with a higher level of automated social presence are considered to be more capable, as well as more intelligent. Warmth and ability are the basic dimensions of social perception. Consumers can better understand and interact with service robots by judging the warmth perception and ability perception of service robots[11]. Social-emotional and relational factors can drive warmth perception, while functional factors can shape consumers' perception of competence[9].

Therefore, this study draws on the research of service robot

acceptance model and social perception theory, and analyzes the service recovery effects of several remedial measures such as apology, explanation and human employee assistance from the perspective of service failure types.

2.2. Service failure

The marketing literature distinguishes between two types of service failure: outcome failure and process failure[12-13]. A result failure is when a service company fails to meet basic service needs or is unable to perform core services (for example, a hotel room booked is unavailable due to overbooking), while a process failure is when there are omissions or inadequacies in the service process (for example, a service staff member is rude during service).

Choi(2020) pointed out that the result failure is related to the perception of capability. Whether the service robot successfully provides the service desired by the consumer determines the perception of the capability of the service robot, and the service robot with the result failure is often considered as having insufficient capability[11]. However, process failure was closely related to perceived warmth, and service robots that made people feel warm caused greater consumer dissatisfaction when process failure occurred, a difference that did not occur after outcome failure. Thus, outcome failure can be interpreted as a failure related to ability[14]. In contrast, process failure involves interpersonal quality and socio-emotional factors that lead to a loss of social resources[15], for which process failure is similar to warm-related failure.

To sum up, analyzing the negative effects of service failure types from the perspective of social cognition and clarifying the differences of service failure types are helpful for the targeted and effective implementation of remedial measures.

2.3. Service recovery

2.3.1. Apology

Apologizing is a remedial strategy to improve interpersonal fairness. In the traditional service environment, apology has always been one of the common remedies for service failures. Will consumers accept an apology from a service robot? Effective apology requires empathy, and sincere apology from service robots can also make up for consumers' dissatisfaction after service failure, and accordingly strengthen the concept of interpersonal fairness[16]. Apology can compensate for the emotional expression of the service robot. Customers' perception and inference of the emotion expressed by the service robot depend on the service recovery entity, and the service recovery effect is often poor if the service robot fails to make customers experience emotion or empathy. For example, Choi et al(2021) studied that apology by highly anthropomorphic robots can eliminate consumers' dissatisfaction, but the remedial behavior of apology by non-anthropomorphic robots cannot eliminate consumers' negative emotions.

2.3.2. Empathy

Relevant studies have proved that the elimination of customers' negative emotions is a direct and critical way to the success of service recovery[17], and empathic ability to understand customers' emotions and positions, think and react from customers' perspectives can comfort customers and eliminate their negative emotions caused by service failure[18].

After service failure, service robots can provide a high level of empathic response for service recovery in time, respond

emotionally to consumers in negative emotions, and fully convey to customers effective information such as understanding, caring for customers' emotions and always taking customers' interests as the core[5]. This kind of emotional response is consistent with the goal of customers seeking to solve problems and make up for emotions after service failure, which will make customers have a positive evaluation of the service robot itself, and induce customers' positive emotions of satisfaction and happiness. So as to achieve the recovery of customers' willingness to continue to use, and finally achieve the purpose of successful remediation. For example, Lv Xinyang et al(2021) found that a high level of empathic response can make up for customers' emotional needs after service failures, thus restoring customers' willingness to continue using the service[5].

2.3.3. Explanation

Interpretation is a remedy to increase the fairness of information[19]. Interpretation is the act of revealing the reasons for service failure, and interpretation is related to perceived information fairness. When the information is perceived to be reasonable, timely, and specific, and when the explainer is perceived to be honest and sincere, consumers perceive the information to be more fair and the interpretation to be more remedial[20].

Consistent with the apology, the validity of the explanation is related to the socio-emotional element of the remedial entity. For example, compared with non-anthropomorphic service robots, anthropomorphic service robots have a better effect on eliminating consumers' negative emotions by explaining after service failure[11]. Unlike an apology, which is a service remedy, the validity of an explanation also depends on the adequacy and authenticity of the information[20-21]. The explanation of the information is true and convincing can also play a role in eliminating the negative emotions of customers.

2.3.4. Human Intervention in Robot Recovery

Consider that service robots, no matter how smart they are designed to be, are no match for humans. When a service robot with social or emotional capabilities delivers an empathetic apology, people feel sincere, persuasive, and warm, but people may not truly believe that a robot has the same social or emotional capabilities as a human. Therefore, when the apology or explanation of service failure by the service robot still fails to obtain consumers' forgiveness, human employees can make alternative explanations or apologies to appease consumers' dissatisfaction[11,22].

3. Discussion

Service robots have penetrated into all aspects of our lives, and consumers will more frequently face service robots at the service front line, and may encounter more service failures. Service failure usually causes consumers to have negative emotions and reduces consumers' intention to continue using robots, which is not conducive to the development and application of intelligent robots. In order to restore consumers' attitude and change their behavior intention, enterprises need to carry out effective service recovery according to consumers' response to different types of service failure.

First, we combed through relevant studies on the types of service failure and found that service process failure is more compatible with the warmth of social cognition. When a service robot with warmth perception makes an apology or

empathy response after a service process failure, consumers will think that the warmth perception of the service robot has a higher degree of fit with apology and empathy, and thus make a positive evaluation^[23]. This is because remedies such as apology and empathy are able to drive consumers' perception of warmth, and service robots are perceived to be more social, helpful and caring. The perception of warmth can lead to positive emotional responses, enhance friendly interactions with others, and be more accepted by others. In other words, the service robot with warmth perception can take emotional responses such as apology and empathy after process failure, because the warmth perception of the service robot is more consistent with the emotional response, and is more consistent with the process failure, so as to eliminate the negative emotions of consumers.

Second, outcome failure is considered a service failure related to competence, and when a service robot is unable to meet a customer's basic service needs, it is often considered a lack of competence, rather than a lack of social or emotional skills. Therefore, after the result fails, the service robot with the ability to perceive will make rational responses such as explanation to increase the perceived information fairness of customers, and consumers will think that the service robot's ability perception and interpretation have a higher degree of fit, so as to make positive evaluations^[23]. Because explanations are made up of logical and factual statements that make consumers feel authentic and reliable, service robots are perceived as more knowledgeable, capable, skilled, and efficient. In other words, a service robot with ability perception can take rational responses such as explanation after result failure, because the ability perception of the service robot is more consistent with the rational response and the result failure, so as to achieve the purpose of eliminating the negative emotions of customers.

Finally, when a service robot fails to perform service recovery, a human employee can assist in the recovery. Although service robot remedies can save operating costs, sometimes compared with human employee remedies, robot apologies or explanations are still considered not sincere and convincing by customers. Therefore, when necessary, companies should consider arranging human employee assistance services as well as service recovery.

References

- [1] Gale, Alastair and Takashi Mochiquki (2019), "Robot Hotel Loses Love for Robots," [available at <https://www.wsj.com/articles/robot-hotel-loses-love-for-robots-11547484628>].
- [2] Wang Haizhong, Xie Tao, Zhan Chunyu. The negative impact of personification of intelligent customer service personification in the Context of service failure: the mediating mechanism of disgust [J]. Nankai Management Review, 2021, 24(04): 194-206.
- [3] Mozafari N, Weiger W H, Hammerschmidt M. Trust Me, I'm a Bot—Repercussions of Chatbot Disclosure in Different Service Frontline Settings[J]. Journal of Service Management, 2022, 33(2): 221-245.
- [4] Hu Y, Kelly Min H, Su N. How Sincere is an Apology? Recovery Satisfaction in a Robot Service Failure Context[J]. Journal of Hospitality & Tourism Research, 2021, 45(6): 1022-1043.
- [5] Lv Xing-Yang, Yang Yu-Fan, XU Shuang-Yu, et al. Supplementing intelligence with emotion: A study on the remedial effect of artificial intelligence empathic response [J]. Tourism Forum, 2021, 36(08): 86-100.
- [6] Xue Zhe, Chen Xiaoyun, Li Yongcheng, et al. Intelligent robot service failure and Customer Continuous Use: A study on the remedial effect of robot empathy [J]. Enterprise Economics, 2023, 42(05): 71-81.
- [7] Rafaeli A, Altman D, Gremler D D, et al. The Future of Frontline Research: Invited Commentaries[J]. Journal of Service Research, 2017, 20(1): 91-99.
- [8] Kim S Y, Schmitt B H, Thalmann N M. Eliza in the Uncanny Valley: Anthropomorphizing Consumer Robots Increases their Perceived Warmth but Decreases Liking[J]. Marketing letters, 2019, 30(1): 1-12.
- [9] Wirtz J, Patterson P G, Kunz W H, et al. Brave New World: Service Robots in the Frontline[J]. Journal of Service Management, 2018, 29(5): 907-931.
- [10] Lu L, Cai R, Gursoy D. Developing and Validating a Service Robot Integration Willingness Scale[J]. International Journal of Hospitality Management, 2019, 80: 36-51.
- [11] Choi S, Mattila A S, Bolton L E. To Err is Human(-Oid): How Do Consumers React to Robot Service Failure and Recovery?[J]. Journal of Service Research, 2021, 24(3): 354-371.
- [12] Bitner M J, Booms B H, Tetreault M S. The Service Encounter: Diagnosing Favorable and Unfavorable Incidents[J]. Journal of marketing, 1990, 54(1): 71.
- [13] Hoffman K D, Kelley S W, Rotalsky H M. Tracking Service Failures and Employee Recovery Efforts[J]. The Journal of services marketing, 1995, 9(2): 49-61.
- [14] Li X, Chan K W, Kim S. Service with Emoticons: How Customers Interpret Employee Use of Emoticons in Online Service Encounters[J]. Journal of Consumer Research, 2019, 45(5): 973-987.
- [15] Chan H, Wan L C, Sin L Y M. Hospitality Service Failures: Who Will be More Dissatisfied?[J]. International Journal of Hospitality Management, 2007, 26(3): 531-545.
- [16] Patient D L, Skarlicki D P. Increasing Interpersonal and Informational Justice When Communicating Negative News: The Role of the Manager'S Empathic Concern and Moral Development[J]. Journal of management, 2010, 36(2): 555-578.
- [17] Du Jiangang, Fan Xiucheng. The influence of Emotion on customer satisfaction and behavior after service recovery: A study based on the perspective of emotional infection [J]. Management World, 2007,(08): 85-94.
- [18] Gelbrich K. Anger, Frustration, and Helplessness After Service Failure: Coping Strategies and Effective Informational Support[J]. Journal of the Academy of Marketing Science, 2010, 38(5): 567-585.
- [19] Colquitt J A, Murphy K R. On the Dimensionality of Organizational Justice: A Construct Validation of a Measure[J]. Journal of applied psychology, 2001, 86(3): 386-400.
- [20] Bradley G, Sparks B. Explanations: If, When, and How they Aid Service Recovery[J]. Journal of Services Marketing, 2012, 26(1): 41-51.
- [21] Colquitt J A. On the Dimensionality of Organizational Justice: A Construct Validation of a Measure.[J]. Journal of applied psychology, 2001, 86(3): 386.
- [22] Dabholkar P A, Spaid B I. Service Failure and Recovery in Using Technology-Based Self-Service: Effects On User Attributions and Satisfaction[J]. The Service Industries Journal, 2012, 32(9): 1415-1432.
- [23] Shan M, Zhu Z, Chen H A, et al. Service Robot'S Responses in Service Recovery and Service Evaluation: The Moderating Role of Robots' Social Perception[J]. Journal of hospitality marketing & management, 2023: 1-24.