



# The influence of emotional intelligence and relationship quality on the service recovery effect of online platform ecosystem

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## Abstract

The service operation modes under the network environment are undergoing some profound changes, and the service recovery effect of online platform ecosystem needs to be paid more attention. Based on the paired questionnaire survey, this paper discusses the impact mechanism of service recovery effect in the platform ecosystem from the perspective of emotional intelligence and relationship quality. The results show that the emotional intelligence of service employees has a positive impact on relationship quality between customers and service providers, and relationship quality between customers and online platforms. The relationship quality between customers and service providers has a positive impact on relationship quality between customers and online platforms, the relationship quality between customers and online platforms has a positive impact on the customer loyalty of online platform. This paper is helpful to deepen the understanding of the impact mechanism of the service recovery effect of the online platform ecosystem, improve the service recovery effect and promote the sound development of the online platforms' business model.

**Keywords** Online platform ecosystem · Service recovery · Emotional intelligence · Relationship quality · Customer loyalty of online platform

## Introduction

The online platform is a medium of interaction between two market entities which have network externality (Armstrong, 2006). With the development of network, online platform service has become an indispensable part of people's life, and is profoundly changing the business model. In online platform services, an online platform ecosystem has been gradually formed. The online platform ecosystem is a kind of business

ecosystem in which different market entities interact for resource sharing and collaboration of creating value based on the technology, mechanism and contract of the online platform enterprises (Zhang & Yan, 2014; Li et al., 2016).

In recent years, there have been many failure cases of the online platform ecosystem services around the world. For example, in July 2019, Mr. Bakos of the UK went to Kyoto, Japan, and rented a B&B through Airbnb (Airbnb is an internationally famous online tourism platform). There is a sliding door between the bedroom and the living room. When Mr. Bakos pulled the door, the door fell down and hurt his head. Mr. Bakos felt disappointed and contacted the service employees of B&B for a refund and compensation. However, the service employees of B&B thought that this accident was caused by Mr. Bakos's improper use not by the quality of the door. The B&B is not responsible, so Mr. Bakos can not be refunded or compensated. Later, Mr. Bakos complained about Airbnb and B&B in anger. In the end, Airbnb and B&B returned Mr. Bakos' accommodation expenses, compensated him \$1200 and apologized.

From Mr. Bakos' case, we can see that Airbnb is an online platform, Mr. Bakos is a customer, and the B&B is a service provider. The service employees serve on behalf of the service provider. Therefore, in the online platform ecosystem, the

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online platform enterprise is responsible for building a service network. Customers customize services through the online platform where provide services to customers through specific service providers. Thus, it forms a ternary interactive relationship among online platforms, customers and service providers. Customers usually directly contact with service providers, while online platforms act as information resource integrators and matchers, such as Airbnb, Uber, Didi Travel, Ctrip, etc. Being different from the traditional customer-enterprise interaction, the online platform ecosystem's service involves the interaction between customer and online platform, customer and service provider, as well as between online platform and service provider.

At present, some researchers have clearly defined online platform, online platform service and online platform ecosystem (Carmelo & Juan, 2013; Hua, 2013; Li, 2016), and also discussed the dimensions of online platform ecosystem, as well as the innovative path of business models and the win-win development model of online platform ecosystem (Chen & Chen, 2016; Yang, Tian & Xie, 2019). The existing literature pays more attention to service failure and service recovery, and studies the influencing factors of service recovery effect from the perspectives of perceived fairness, customer participation and customer psychological contract (Ashraf & Manzor, 2017; Sviri et al., 2011; Valenzuela & Cooksey, 2014; Jia & Zhao, 2018). In the online platform ecosystem, due to the intangibility, synchronization and heterogeneity of service products (Du & Fan, 2012), service failure in the online platform ecosystem is inevitable, which requires service recovery to restore customer trust and enhance the competitiveness of the online platform enterprises. However, the current research on the online platform ecosystem's service failure and service recovery is still lacking, so there is an urgent need to explore the issues of service failure and service recovery for the online platform ecosystem.

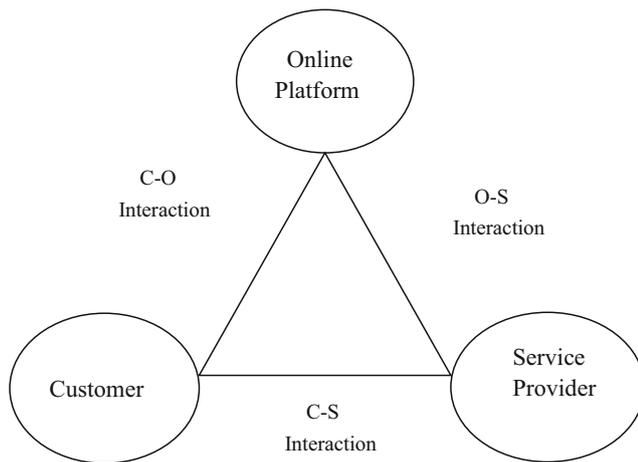
In order to deeply explore the influence mechanism of the service recovery effect of online platform ecosystem, deepen the understanding of the service recovery of online platform ecosystem, and enrich the theoretical system of online platform ecosystem service, this paper focuses the influence of emotional intelligence of service employees on relationship quality, and the influence of different relationship quality, and explore the formation mechanism of customer loyalty of online platform. This study tries to expand the theories and scenarios of service recovery, emotional intelligence and relationship quality, and help to explain the mechanism of service recovery effect in platform ecosystem from a broader perspective. This study also tries to provide theoretical reference for online platform service enterprises to improve the service recovery effect, improve the competitiveness of online platform enterprises, and promote the healthy development of business model of online platform ecosystem.

## Literature Analysis and Research Hypothesis

### Online Platform Ecosystem

As a typical application of spatial crowdsourcing, online platform is becoming more and more popular in the era of mobile Internet and sharing economy (Xu et al., 2020). Due to the development of information technology, transaction costs between and within different market entities have been saved. Retailers, PC operators, online travel agencies (OTA), digital pad, internet systems are building their own online platforms to conduct online marketing, trading and services, and to obtain consumers' affinity (Thomas et al., 2011; Carmelo & Juan, 2013; Kim et al., 2017; Zhou et al., 2020). Platform service refers to the interaction and transaction of products and services by service participants through the support provided by the shared platform (Hua, 2013). At present, the research on online platform service mainly focuses on online platform modes, bilateral market pricing, market strategy, decision-makings of mixed supply chains, economy equilibrium analysis and other aspects (Zhang & Ma, 2017; Wang & Yu, 2018). By building the online platform, online platform enterprises attract new service providers to help them share resources and create value so as to create the online platform ecosystem. The online platform ecosystem is a kind of business ecosystem in which different market entities interact for resource sharing and coordination of creating value based on the technology, mechanism and contract of the online platform enterprises (Zhang & Yan 2014; Hua et al., 2018; Li et al., 2016). The trend of service enhancement, modular alliances and borderless development have an industrial impact on enterprises under the background of "Internet +". The competition among enterprises turns to ecosystem competition centered on online platform enterprises, which makes enterprises actively or passively embed in the networks (Hacklin et al., 2009; Tiwana et al., 2010).

In the online platform ecosystem, customers customize services through an online platform, and then the services are offered through specific service providers. It forms ternary interactive relationships among customers, the online platform and service providers as shown in Fig. 1. And the online platform enterprise can bring together customers and service providers, so it's the core enterprise in the online platform ecosystem. The online platform ecosystem can be divided into six dimensions: platform background, platform network, platform cooperation, platform association, platform evolution and platform evolution innovation (Chen & Chen, 2016). Although the online platform ecosystem has been highly involved in people's lives, the current research on the business model of the online platform ecosystem is still relatively lacking, which needs to be further explored.



**Fig. 1** Ternary interaction among customers, online platforms and service providers in the online platform ecosystem

## Service Recovery

Service failure refers to the result that the service provided by the service enterprise fails to meet the minimum acceptable standard of customers and cannot meet the requirements and expectations of customers resulting in dissatisfaction of customers (Chaouali et al., 2020). Service failure can be divided into result failure and process failure (Smith & Bolton, 1998). Result failure mainly refers to the failure of service enterprises to achieve basic service content and meet customers' expectations, while process failure mainly refers to the unpleasant service experience caused by defects in some service mode (Bitner et al., 1990; Smith et al., 1999; Priluck, 2003). Due to the universality and inevitability of service failure, it has attracted the attention of scholars since the 1980s. The definition, classification, causes, influencing factors and consequences of service failure have been extensively discussed, which enriches the research on service failure (Bitner et al., 1990; Maxham, 2001; Harris, 2006; Sven et al., 2015; Kelly, 2018; Liu et al., 2019).

When consumers encounter service failure, they feel that the resources they exchanged are devalued. And the feeling causes psychological dissatisfaction and complaints (Du & Fan, 2012). Therefore, service recovery is needed at the time. Service recovery is the response and measures taken by service providers to alleviate customers' dissatisfaction and complaints and restore customers' trust after service failure (Kelly, 2018; Wei et al., 2020). Service recovery can not only maintain customer satisfaction, but also obtain a higher level of customer satisfaction than before service failure so as to improve repurchase intention (Bernardo et al., 2013). Academic circles have paid attention to the influencing factors of service recovery effect from different perspectives. The current literature focuses on the impact of perceived fairness of customers in online shopping, retail and tourism industries on service recovery quality, customer satisfaction and customer loyalty (Assefa, 2014; Siu et al., 2014); the impact mechanism of service recovery effect

was analyzed from the perspective of emotion, emotional balance and emotional infection (Svari et al., 2011; Jia & Zhao, 2018); the existing research suggests that customer participation and joint remediation can improve the service recovery effect (Ashraf & Manzor, 2018). Research shows that, compared with the outcome failure in emerging markets, process failure has a higher probability of customer churn, process failure recovery is more effective than result failure recovery, and employee behavior has a greater impact on process failure than result failure (Borah et al., 2020). In terms of the influencing mechanism of customer satisfaction after service recovery, some scholars also focused on the influence of customer misconduct, time perception, cultural differences, customer psychological contract violation, economic compensation and emotional compensation, group failure and individual failure on customer satisfaction after service recovery (Valenzuela & Cooksey, 2014; Liu et al., 2018; Albrecht et al., 2017; Wei et al., 2020). However, the existing research is based on the customer-enterprise interaction paradigm. With the prosperity of network platform services, the online platform and service provider offer services to customers at the same time, it is urgent to adopt the customer-online platform-service provider interaction paradigm to explore the service failure and service recovery under the online platform ecosystem environment.

## Emotional Intelligence

In the study of emotional intelligence, there are two schools in academic circles. The schools of ability emotional intelligence represented by Mayer & Salovey think that emotional intelligence is a kind of ability for people to manage their own emotions and others people emotions, and guide their own cognition and behavior with the information they get (Mayer et al., 1990; Yang et al., 2013), which can be divided into four dimensions, namely, emotional perception, emotional integration, emotional understanding and emotional management (Mayer & Salovey, 2004). The school of idiosyncratic emotional intelligence believes that the definition of emotional intelligence is the behavior and ability to recognize other emotions, recognize and control their own emotions, and control the initiative of interpersonal relationships. Its dimensions include five dimensions: recognizing self emotions, properly controlling emotions, self motivating, recognizing other people emotions and managing interpersonal relationships (Goleman, 1995; Kantor et al., 2020). Among the measuring tools of emotional intelligence, the representative ones can be divided into three categories. The first one is the task-based measurement method which is based on the theory of ability emotional intelligence school. The representative measurement tool is Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) developed by

Mayer, Salovey & Caruso (1998). The second one is the questionnaire method of ability emotional intelligence, which is based on the theory of ability emotional intelligence school. The representative scales are Self-report Emotional Intelligence Inventory (SSREIT) developed by Schutte et al. (1999), Workplace Emotional Intelligence Test (WEI) developed by Wong & Law (2002), Emotional Intelligence Self-directed Inventory (EISDI) developed by Groves et al. (2008). The third is the mixed emotional intelligence questionnaire, which is represented by the emotional quotient Inventory (EQI) of Bar-on (2000), Trait Emotional Intelligence Questionnaire (TEIQ) of Petrides & Furnham (2001).

As for the influence of emotional intelligence, the most current research is the influence of managers or employees' emotional intelligence on job performance. Through the empirical investigation and research on 103 salesmen, the scholars found that the emotional intelligence of the salesmen is positively related to their sales performance (Rozell et al., 2006), and also studied and demonstrated that the emotional intelligence of employees is positively related to their work performance and organizational behavior in different business environments (Carmeli & Josman, 2006; Othman et al., 2008; Kernbach & Schutte, 2005). Waiters with higher emotional intelligence can be able to adopt positive psychology at work and obtain better mental health status (Meng & Zhang, 2012). Some studies have analyzed the relationship among emotional intelligence, team communication and job satisfaction, which shows that emotional intelligence has a unique contribution to job satisfaction, which can help military cadets experience higher job satisfaction (Valor-Segura et al., 2020). In the research of service recovery, some researchers take Korean travel agency employees as samples, the research shows that emotional intelligence has a positive impact on customer orientation, and customer orientation plays a mediating role between emotional intelligence and service recovery efforts (In et al., 2016). However, in the service recovery of online platform ecosystem, there is still a lack of research on the impact of emotional intelligence of service employees on service recovery effect, which needs to be paid more attention.

## Relationship Quality

Since the 1990s, the research on relationship quality has been active. The meaning of relationship quality is different because of the different research objects. Many researchers have explored the relationship quality in its specific context. The concept of relationship quality can be understood and deconstructed from the perspective of interpersonal communication between the two parties or from the perspective of profit (Pantouvaki & Bouranta, 2017; Huang et al., 2020). In terms of service industry, relationship quality refers to customer satisfaction and trust to service

providers (Crosby et al., 1990; Leonidou et al., 2014). The research on the dimensions of relationship quality is also active. In early classical studies, the dimensions of relationship quality are mainly divided into trust, commitment and satisfaction (Crosby, 1990; Hennig, & Klee, 1997; Johnson, 1999; Gutek et al., 1999; Zhang et al., 2019). Since the beginning of the twenty-first century, some researchers have proposed that relationship quality should also include relationship intensity, conflict resolution, identity, cooperation, obligation, and emotionality according to different situations (Gwerner & Gremler, 2000; Colgate, 2003; Rafiq et al., 2013; Bu & Roy, 2015; Li & Shen, 2017; Olavarria-Jaraba et al., 2018). In the study of relationship quality of online shopping platforms, some researchers think that relationship quality includes two dimensions: customer satisfaction and customer trust (Dong, 2015). Research literature shows that relationship quality is the outcome of service quality, and also the antecedent variable of relationship satisfaction (Wong & Sohal, 2002). Some researchers also discussed the significant or certain influence of perceived equity, perceived value, word-of-mouth, brand fit, environmental responsibility, outsourcing effect, different embedded relationship situations on relationship quality (Jessica et al., 2015; He et al., 2018).

Studies have shown that individuals with high emotional intelligence will be able to accurately perceive other people's emotions, which may be more helpful to correctly perceive other people's needs and opinions, and be more able to cater to others in language and behavior, and have a more harmonious relationship with others so as to obtain higher relationship quality (Butler et al., 2003; In et al., 2020). In the relationship between husband and wife, some scholars have conducted an experimental study on 86 heterosexual couples. The results show that the husband and wife with high emotional intelligence will bring better relationship quality (Brackett et al., 2005). Schroder-Abe & Schutz (2011) conducted an empirical study on 191 heterosexual couples and found that a person's perception of relationship quality is not only affected by their emotional intelligence, but also by their partner's emotional intelligence. For the middle school students, middle schools with high emotional intelligence are more likely to handle the relationship with their classmates, and emotional intelligence is positively correlated with the quality of relationship (Li et al., 2007). In the workplace, the emotional intelligence of leaders can improve the quality of the relationship between leaders and subordinates. High emotional intelligence is a necessary quality for excellent leaders (Mahadi & Nomahaza, 2011; Jung et al., 2020). Kim & Lee (2016) took 306 foreigners as the research objects and conducted an empirical study with questionnaires, and found that emotional intelligence has a positive impact on relationship quality. In the service industry, it is found that service providers with high emotional intelligence can make customers more satisfied and get more harmonious employee-

customer relationship, that is, the relationship quality level is higher (Daus & Rater, 2001; Kernbach et al., 2005; Hoppner et al., 2015). According to the above literature analysis, in the service recovery of online platform ecosystem, service employees with high emotional intelligence can improve the relationship quality between customers and service providers, and the relationship quality between customers and online platforms. Meanwhile, with the improvement of relationship quality between customers and service providers, customer trust and satisfaction on the online platform will be improved so as to improve the relationship quality between customers and online platforms. Therefore, three hypotheses are put forward:

H1: Emotional intelligence of service employees has a positive effect on relationship quality between customers and service providers;

H2: Emotional intelligence of service employees has a positive effect on relationship quality between customers and online platforms;

H3: Relationship quality between customers and service providers has a positive effect on relationship quality between customers and online platforms.

## Customer Loyalty

Scholars generally tend to define customer loyalty from the perspective of attitude loyalty and behavior loyalty, which refers to customers' choice preference and repeated purchase behavior for products or services of enterprises in a long period of time (Rasoulia, 2016; Barnes et al., 2016; Melián-Alzola & Martín-Santana, 2020). The dimensions of customer loyalty can be divided into cognitive component, emotional component and behavior, reconstruction intention, repeat purchase, recommendation to others, attention, etc. (Choi et al., 2012; Kundu & Bose, 2015). In the aspect of scale development, Sutanto & Minantyo (2014) developed the customer loyalty scale when they studied the product quality, customer satisfaction and customer loyalty of service products. Scholars believe that customer satisfaction will affect the future purchase behavior of customers, which is the prelude to customer loyalty. Under certain conditions, service quality can also have a direct impact on customer loyalty (Chang et al., 2009; Santouridis & Trivellas, 2010; Pentji et al., 2011).

According to the existing literature, two key dimensions of customer loyalty in the context of service recovery are repeated purchase and recommendation to others (Li, 2014; Jian & Ke, 2017; Melián-Alzola & Martín-Santana, 2020), and relationship quality includes two dimensions of customer satisfaction and customer trust (Dong, 2015). Relationship quality has a significant positive effect on customer repurchase intention (Zhao & Wang, 2012). Based on the changing trend of the food retail

industry in India, this paper further tested the effect of relationship quality on customer loyalty (Prasad & Aryasri, 2008). In the online shopping environment, good relationship quality can not only reduce the uncertainty of consumers when purchasing service products, but also have a positive impact on customer loyalty (Rafiq et al., 2013). Shin (2019) takes online fresh supermarket in Korea as the research object, and through empirical analysis, confirms that relationship quality has a positive impact on customer satisfaction and customer loyalty. In the nail care industry, studies have confirmed that customer satisfaction with nail service will affect the reliability of nail service and employee participation, and relationship quality has a positive impact on customer satisfaction and customer loyalty (Jeong & Jang, 2016). Garepasha (2020) examined the relationship between relationship quality and online customer loyalty in different stages of the relationship. The level of customer relationship determines the impact of relationship quality on customer loyalty (Mattila, 2001). With the development of customer enterprise relationship, the impact of network trust on customer loyalty will also increase. Therefore, in the online platform ecosystem environment, when the service failure occurs, the service employees carry out the service recovery. If the relationship quality between customers and online platforms is improved, the customer will have a good feeling on the online platform, and will repeatedly purchase and recommend the online platform to others, thus forming customer loyalty to the online platform. Therefore, Relationship quality between customers and online platforms, and relationship quality between customers and service providers play mediating effect. Based on the above analysis, three hypotheses are proposed.

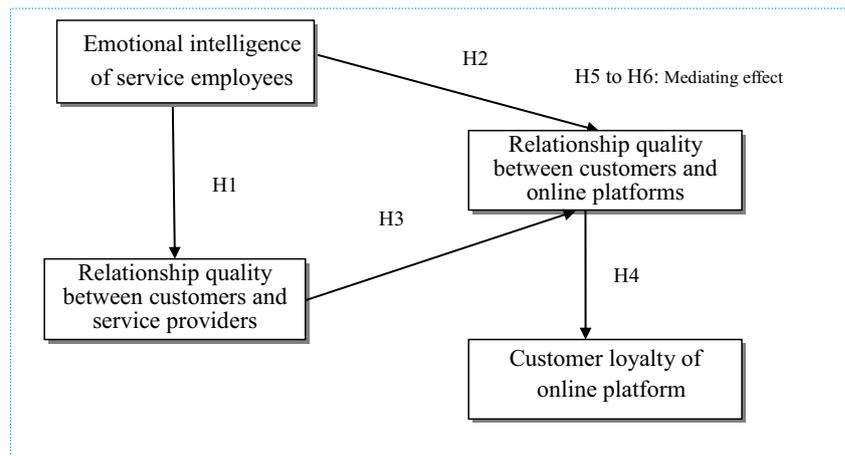
H4: Relationship quality between customers and online platform positive effect on customer loyalty of online platforms;

H5: Relationship quality between customers and online platforms mediating effect between emotional intelligence of service employees and customer loyalty of online platform;

H6: Relationship quality between customers and online platforms, and relationship quality between customers and service providers play mediating effect between emotional intelligence of service employees and customer loyalty of online platform.

According to the above six research hypotheses, this paper constructs a research model as shown in Fig. 2. Relationship quality between customers and service providers, relationship quality between customers and online platforms, and customer loyalty of online platform are all the variables to measure the service recovery effect of online platform ecosystem.

Fig. 2 Research model



## Methods

### Variable Measurement

The measured variables in this study include emotional intelligence of service employees, relationship quality between customers and service providers, relationship quality between customers and online platforms, customer loyalty of online platform. In order to ensure the pertinence of the four variables, this study uses relevant scales of authoritative literature published by scholars at home and abroad, and makes corresponding modifications according to the service recovery scenario of online platforms ecosystem. All measurement items are measured by using Likert 5-point scale, and the options include “very consistent, conformed, basic conformed, not very conformed, and not conformed”. The Emotional intelligence scale of service employees refers to the emotional intelligence scale of Schutte et al. (1998) and Wong & Law (2002), and sets five items. The scale of relationship quality between customers, and the scale of relationship quality between customers and online platform refer to the research results of the relationship quality scales of Griffith et al. (2006), Jessica et al. (2015), Wang & Guo (2018), with special consideration for the characteristics of the ternary interaction between customers, online platforms and service providers in the ecosystem and set up with 4 items respectively. The scale of customer loyalty of online platforms refers to the results of the customer loyalty scales of Morgan & Hunt (1994), Doney et al. (1998), Parasuraman et al. (2005), and sets three items.

The questionnaire is divided into the part for service employees and the part for customers. The part for service employees includes only the emotional intelligence of service employees with a total of 5 items. The variables in the part for customers include relationship quality between customers and service providers, relationship quality between customers and online platforms, and customer loyalty of online platform

with a total of 11 measurement items. In addition, the questionnaire also set up questions about personal information of service employees and customers. Three questions were filled in by service employees, which were about service employees’ gender, age and education background; five questions were filled in by customers relating to customers’ gender, source, age, education background and occupation. Setting personal information questions is mainly to understand the source and composition of samples. This study does not analyze the influence of gender, age and education on related variables, which will be discussed in future research.

### Sample and Data Collection

In this study, 41 people were selected for pre-test before the formal test of the questionnaire. According to the results of the pre-test, the technical problems such as statement expression in the questionnaire items were corrected so as to avoid the possible social expectation deviation and common method deviation of the respondents. In the formal questionnaire survey, we looked for samples of service employees and customers who have the service recovery experience of online platform. Service employees refer to all participants of the service enterprises participating in service recovery.

In this study, service employee and customer samples are required to have the service recovery experience of online platform, and they are willing to participate in the questionnaire survey. This study mainly obtains samples through the following two ways: First, cooperating with some online platforms like “Ctrip”, “Fangtiansia”, “Didi Travel” and their service providers, we directly sent the questionnaires through the platforms’ APP to service employee and customers that meet the requirements. Second, we got the samples by searching for appropriate service employees and customers through Wechat and QQ.

In the process of the survey, we took the one employee-to-one customer matching. First, we asked a service employee to fill in the first part of the questionnaire, and then randomly select a customer that the service employee has served to fill in the second part of the questionnaire. In the process of the survey, the investigators asked the subject to fill in the questionnaire in a relaxed situation such as the rest time of enterprise employees and the after-school time of students. The purpose of the questionnaire research and the requirements for filling in the questionnaire were fully explained by the investigators. Wechat cash bonus, lottery tickets, gifts and other incentive measures were given to the subjects. In this study, 243 questionnaires were collected. Except the incomplete questionnaires and the ones with contradictory answers, 227 were valid. The effective response rate is 93.42%. So, the sample of service employees was 227, and the sample of customers was 227, too.

In the process of questionnaire survey, researchers tried to avoid social desirability bias. Scholars believe that there are three main reasons for the occurrence of social desirability bias: The subjects themselves have higher social desirability; the test situations stimulate the social desirability bias of the subjects; and the items themselves cause the social desirability bias (Paulhus, 2002). In this survey, the selected subjects include the general Chinese citizens, farmers and students. They are only ordinary citizens, and their social status is not very high. They have no high social desirability, so they can make a more objective evaluation based on the facts. There is no social desirability in the guidance of the questionnaire. Before the survey, we told the respondents that the questionnaire was anonymous and would not reveal privacy, so that they could fill in the questionnaire objectively. We also optimized the items' expression of the questionnaire to prevent social desirability bias.

Researchers also tried to solve the problem of non-response bias in the process of questionnaire survey. In the process of investigation, there are many factors leading to the missing or non-response of some individuals in the sample, so that the final valid sample is only a part of the survey sample (McGovern et al., 2018; Smironva et al., 2019). In this questionnaire survey, we have adopted some measures to avoid and reduce the problem of non-response bias. First, in the sample selection stage, when we collect subjects through platform enterprises, Wechat, QQ, etc., we require the subjects to participate in the questionnaire survey voluntarily and have the experience of network platform service recovery, which greatly reduces the probability of non-response. Secondly, in the process of the questionnaire survey, we conducted training on questionnaire filling for the subjects, and informed them the process and method of filling in and answering, which improved the filling rate of the questionnaire and reduced the problem of non-response bias.

In the sample of service employees, there are 89 males and 138 females, accounting for 39.21% and 60.89% respectively. The percentage is in line with the reality that there are more females in service employees in China. In terms of the age distribution of service employees, the number of service employees under 25 years old is 79, accounting for 34.80%; the number of service employees between 26 to 44 years old is 101, accounting for 44.49%; the number of service employees over 45 years old is 47, accounting for 20.71%. In terms of educational background structure of service employees, there are 46 service employees with secondary or below education background, accounting for 20.26%, 113 with a junior college degree, accounting for 49.78%, 62 with a bachelor degree, accounting for 27.31%, and 6 with a master degree or a doctoral degree, accounting for 2.64%.

The distribution of customer samples is shown in Table 1. Gender, region, age, education and occupation of customer samples are counted respectively.

## Data Analysis and Hypothesis Test

### Reliability and Validity Test

At present, Cronbach's  $\alpha$  coefficient is generally used to measure the reliability of the questionnaire data. The higher the coefficient value is, the stronger the internal consistency of the questionnaire is, and the higher the reliability is. Cronbach's  $\alpha$  requires more than 0.70 (Nunnally, 1994). As shown in Table 2, Cronbach's  $\alpha$  coefficient of four variables is between 0.752–0.869, which is greater than the threshold value of 0.70, indicating that the internal consistency and stability of the questionnaire meet the requirements and pass the reliability test.

In terms of content validity, all items of the questionnaire refer to the research results of the authoritative journals, and are adjusted in combination with the scenario of the online platforms' ecosystem to ensure the content validity of the items of the questionnaire. Convergence validity is shown in Table 2. Standardized load factors of each item are greater than 0.50, T value is greater than the threshold value of 1.96, the combination reliability (CR) value of each variable is greater than 0.70, and the average extraction variance (AVE) is greater than 0.50, which all meets the test standard of convergence validity in Hair (2006) and Wu (2010), so convergence validity passes.

The analysis of discriminant validity is shown in Table 3. The square root value of average refined variance (AVE) of each variable is greater than the correlation coefficient between the variable and other variables. According to the standard of Li et al. (2012), it shows that the questionnaire has significant discriminant validity. In terms of construct validity test, the measurement values of the study model fit are shown

**Table 1** Customer sample distribution

One class indicators	Two class indicators	sample size	Percentage	One class indicators	Two class indicators	Sample size	Percentage
Gender	Male	111	48.90%	Education	Junior middle school	22	9.69%
	Female	116	51.10%		High school	44	19.38%
Region	First-tier cities	25	11.01%	Occupation	College degree	88	38.77%
	Provincial capita	38	16.74%		Bachelor	54	23.79%
	Other cities	96	42.29%		Master and doctor	19	8.37%
	County or town	39	17.18%		Civil servant	23	10.13%
Age	Rural areas	29	12.76%	Professional	51	22.47%	
	Under 25 years	49	21.59%	Enterprise staff	74	32.60%	
	26–35 years	83	36.56%	Farmer	31	13.66%	
	36–59 years	71	31.28%	Student	20	8.81%	
	Over 60 years	24	10.57%	Other	28	12.33%	

in Table 4,  $\chi^2/df$  is 2.689, CFI is 0.947, TLI is 0.943, SRMR is 0.041, RMSEA is 0.057. According to the good model standards of Sharma (1996) and Wu (2010):  $\chi^2/df$  is less than 5, CFI and TLI are more than 0.90, SRMR is less than 0.05 and RMSEA is less than 0.1, so the research model's all the above indicators have reached the standard of good model, and the construct validity of questionnaire has passed the test.

## Hypothesis Test

### Direct Impact Relationship Test

In this study, structural equation model is used to analyze the direct influence relationship between variables. Compared with regression analysis, structural equation model is more

**Table 2** Test for reliability and convergent validity

Variables	Items	Normalized load factor	T Value	Cronbach's $\alpha$	CR	AVE
Emotional intelligence of service employees	1. I know my emotions very well	0.799	7.681	0.869	0.908	0.666
	2. I can quickly detect customers' emotions	0.743	4.021			
	3. I can always motivate myself	0.726	4.952			
	4. I have strong emotional self-control ability	0.903	9.723			
	5. I can quickly turn anger into calmness	0.862	5.128			
Relationship quality between customers and service providers	6. I can smoothly communicate with the service provider	0.829	2.946	0.821	0.867	0.620
	7. I think the service provider is honest	0.767	4.664			
	8. I now trust service provider more	0.709	3.016			
	9. I have emotional dependence on service provider	0.837	4.533			
Relationship quality between customers and online platforms	10. I think the online platform is reliable	0.818	3.936	0.834	0.870	0.626
	11. The online platform is very attractive to me	0.762	3.652			
	12. The online platform gives me a lot of help	0.771	4.276			
	13. I trust the online platform more	0.813	5.339			
Customer loyalty of online platform	14. I will continue to use the online platform	0.857	6.483	0.752	0.795	0.567
	15. I will recommend others to use the online platform	0.672	4.782			
	16. I will be a fan of the online platform	0.718	6.622			

**Table 3** Test for discriminative validity

Variables	1	2	3	4
1. Emotional intelligence of Service employees	0.816			
2. Relationship quality between customers and service providers	0.602	0.787		
3. Relationship quality between customers and online platforms	0.574	0.641	0.791	
4. Customer loyalty of online platform	0.437	0.524	0.664	0.753

Note: The value on the diagonal is the square root of AVE, other data is the correlation coefficients of corresponding variables

suitable for hypothesis testing, which is conducive to analyze from different perspectives, while regression analysis ignores the existence and role of other dependent variables when it studies the influence of independent variables on a dependent variable (Wu, 2010). In this study, Amos23.0 software was used to test the hypotheses of the study with the structural equation model.

As shown in Table 5, the emotional intelligence of service employees has a positive effect on the relationship quality between customers and service providers, and its standardized path coefficient is 0.622,  $T = 4.121$ . H1 passes the test. The emotional intelligence of service employees has a positive effect on the relationship quality between customers and online platform, its standardized path coefficient is 0.397,  $T = 1.982$ , which is statistically significant. Therefore, H2 also passed the test. The standardized path of relationship quality between customers and online platform is 0.529,  $T = 3.882$ , H3 pass the test. Table 5 also shows that the standardized path coefficient of relationship quality between customers and online platform to customer loyalty of online platform is 0.708,  $T = 3.627$ , and H4 has passed the test.

### Mediating Effect Test

In the simple mediating effect test, bootstrap method has obvious advantages and is more scientific and accurate than causal stepwise regression method (Hays et al., 2011; Taylor et al. (2008). Therefore, this paper uses the bootstrap verification program developed by Hays (2013) for mediating verification.

In order to further confirm the existence of chain mediating effect, this study constructs the competition model of parallel mediating effect and the chain mediating effect model for comparison. The two models' indexes of fit of are shown in Table 6. The  $\chi^2/df$  of competition medium is 6.045, the CFI

**Table 4** Research model fit

Fit index	$\chi^2$	df	$\chi^2/df$	CFI	TLI	SRMR	RMSEA
Index value	287.74	107	2.689	0.947	0.943	0.041	0.057

and TLI are greater than 0,90, the SRMR is 0.072, and the RMSEA is 0.124. All the data indicate that the model has poor fit. The chain mediation model's fit indexes Including  $\chi^2/df$ , CFI, TLI, SRMR and RMSEA are all in good agreement with the requirements, and better than the parameters of the parallel mediation competition model. Therefore, the chain mediating effect does exist.

The mediating effect test is shown in Table 7. The indirect effect value of the mediation path "emotional intelligence of service employees → relationship quality between customers and service providers → customer loyalty of online platform" is 0.324, accounting for 61.02% of the total effect. It shows that the relationship quality between customers and service providers plays a mediating effect between emotional intelligence of service employees and customer loyalty of online platform. H5 passes the test.

The indirect effect value of mediation path "emotional intelligence of service employees → relationship quality between customers and service providers → relationship quality between customers and online platform → customer loyalty of online platform" is 0.103, accounting for 19.40% of the total effect, indicating that the relationship quality between customers and service providers, and relationship quality between customers and online platform play a mediating effect between emotional intelligence of service employees and customer loyalty of online platform, H6 passes the test. As shown in Table 7, the total indirect effect and the confidence interval of two scores of indirect effect do not contain 0, which is statistically significant. The specific inspection results are shown in Table 7.

## Conclusion and Discussion

### Research Conclusion and Theoretical Contribution

First of all, this study shows that the emotional intelligence of service employees has a positive impact on the relationship quality between customers and service providers, and relationship quality between customers and online platform, but the emotional intelligence of service employees has a stronger impact on the relationship quality between customers and

**Table 5** The results of hypothesis test

Hypothesis	Structural path	Standardization path coefficient	T value	Results
H1	Emotional intelligence of service employees→ Relationship quality between customers and service providers	0.622	4.121**	Supported
H2	Emotional intelligence of service employees→ Relationship quality between customers and online platform	0.397	1.982*	Supported
H3	Relationship quality between customers and service providers→ Relationship quality between customers and online platforms	0.529	3.882**	Supported
H4	Relationship quality between customers and online platforms→ Customer loyalty of online platform	0.708	5.627**	Supported

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

service providers. Therefore, the hypothesis H3 and H4 are supported. This is because the service employees who implement service recovery come from service providers, and the emotional intelligence of service employees is more effective to improve the relationship quality between customers and service providers. This not only confirms the conclusion that emotional intelligence of service employees can improve the relationship quality between customers and service providers (Daus & Rater, 2001; Kernbach et al., 2005), and further demonstrates that emotional intelligence of service employees in the environment of online platforms ecosystem can also have a positive impact on the relationship quality between customers and service providers, and relationship quality between customers and online platform. Thus, it deepens and expands the research on the relationship between service recovery quality and relationship quality, which is conducive to better explain the impact mechanism of service recovery effect.

Secondly, this study shows that relationship quality between customers and service providers has a positive impact on relationship quality between customers and online platform, and relationship quality between customers and online platform has a positive impact on customer loyalty of online platform. Therefore, the hypothesis H3 and H4 are supported. This study not only confirms the conclusions from Prasad & Aryasri (2008), and Rafiq et al. (2013) that relationship qualities of offline and online retail have a positive impact on customer loyalty, but also further tests the impacts of different

relationship quality types based on the environment of online platforms ecosystem, as well as the impact of relationship quality between customers and online platform on customer loyalty of online platform, thus enriching the research about relationship quality and customer loyalty. The research connotation and applicable scenarios of loyalty provide the theoretical and empirical basis for clarifying and explaining the impact of different relationship quality types in platform ecosystem service recovery.

Thirdly, this study confirms that relationship quality between customers and online platform plays a mediating effect between the emotional intelligence of service employees and customer loyalty of online platform. The relationship quality between customers and service providers, and the relationship quality between customers and online platform play a mediating effect between the emotional intelligence of service employees and customer loyalty of online platform. Therefore, the hypotheses of H5 and H6 are also supported. Although previous studies have discussed the mediating effect of relationship quality (Shen, 2013; Brady et al., 2016), this study extends the research on the mediating effect of relationship quality to the field of online platform ecosystem, and explores the mediating effect of two different types of relationship quality, which is conducive to better understanding the intermediary role of two types of relationship quality for service recovery in the online platform ecosystem. It provides a theoretical reference for further exploring the intermediary mechanism about service recovery effect of the platform ecosystem.

**Table 6** Test of competition model of mediating effect

Model	$\chi^2$	df	$\chi^2$ /df	CFI	TLI	SRMR	RMSEA
Chain mediating effect	46.653	17	2.744	0.924	0.919	0.043	0.067
Parallel mediating effect(Competition model)	108.812	18	6.045	0.794	0.824	0.072	0.124

**Table 7** Test results of mediating effect

Mediating effect path	Indirect effect value	Standard error Boot SE	Upper limit Boot CI	Lower limit Boot CI	Effect Proportion
1. Emotional intelligence of service employees → Relationship quality between customers and service providers → Customer loyalty of online platform	0.324	0.035	0.277	0.403	61.02%
2. Emotional intelligence of service employees → Relationship quality between customers and service providers → Relationship quality between customers and online platform → Customer loyalty of online platform	0.103	0.023	0.03	0.08	19.40%
3. Total mediating effect	0.427	0.036	0.341	0.485	80.42%
4. Total effect	0.531	0.024	0.413	0.714	100%

## Practical Implications

Firstly, according to the research conclusion, the emotional intelligence of service employees has a significant positive effect on the relationship quality between customers and service providers, and relationship quality between customers and online platform, which shows that the emotional intelligence of service employees plays an important role in improving the relationship quality after service failure. Therefore, in the recruitment process of service employees, service enterprises should test the emotional intelligence level of the employees. The test should adopt the current authoritative measurement scale, such as the WLEIS scale of Wong & Law (2002) and be run by psychological experts. After testing the emotional intelligence level of service employees, the service enterprise decides the recruitment result again to ensure that the hired service employees have better emotional intelligence level and can better cope with service failure. Every year, the service enterprises should test the service employees' emotional intelligence and physical condition together. In daily work, service providers also need to take some necessary measures to improve the emotional intelligence of service employees.

Secondly, the empirical analysis of this study shows that relationship quality between customers and online platform has a positive impact on customer loyalty of online platform, while relationship quality between customers and service providers has a positive impact on relationship quality between customers and online platform. It can be found that the relationship quality between customers and service providers is the basis of forming the relationship quality between customers and online platform. The improvement of the relationship quality between customers and service providers can improve the relationship quality between customers and online platform, and there is a certain "love the house and the black" (Chinese proverb). When the relationship quality between customers and online platform is improved, the customer loyalty of online platform will be directly improved.

Therefore, service providers should optimize the recovery process and strategy, adopt scientific recovery methods to decrease customers' dissatisfaction so as to turn "hostility" into "friendship", and improve the relationship quality of between customers and service providers. On this basis, we should guide customers to improve the relationship with the online platform, publicize the convenience and preferential measures of the platform, and improve the relationship quality between customers and online platform.

## Research Limitations and Prospects

First of all, this research only studies the impact mechanism of service recovery effect of the online platforms ecosystem from the perspective of emotional intelligence. However, in the practice of platform service, there are many factors that affect service recovery based on the online platforms ecosystem such as service recovery quality, perceived fairness, compensation method, customer sentiment, etc. Therefore, in the future, we should expand the research framework, further optimize the research model, and study the impact mechanism of service recovery effect for the online platforms ecosystem from more diversified levels.

Secondly, in the process of questionnaire survey, this study adopts the method of 1-to-1 matching survey to collect survey data, that is, first let a service employee fill in the first part of the questionnaire, and then randomly select a customer of the employee to fill in the second part of the questionnaire in order to maintain the statistical validity. But it doesn't exclude that some of our selected customers are not representative. Therefore, in the future research, we should try to use 1-to-more matching survey to collect survey data and compare the differences with the research results of the one to one matching survey.

Thirdly, this study explored the relationship between emotional intelligence of service employees and customer-service provider relationship quality and other variables, but some scholars believe that emotional intelligence can also be

divided into different dimensions such as emotional perception and emotional management (Mayer & Salovey, 2004). In the future, we should refine the research on each dimension of emotional intelligence of service employees, and pay attention to the influence of different dimensions of emotional intelligence on related variables. At the same time, the age, gender, education background and occupation of the research sample may also have different effects on relationship quality and customer loyalty. These factors should be considered in future research, which will have greater guiding value for platform business practice.

**Data Availability** All data generated or analysed during this study are included in this published article.

### Compliance with Ethical Standards

**Conflict of Interest** On behalf of all authors, the corresponding author states that there is no conflict of interest.

**Ethical Statement** In the research process of this paper, there is no ethical issues, no moral disputes, after the review of the academic department of Guilin University of technology.

**Informed Consent** we understand the regulations of the magazine. If my paper can be published, the data and information of my paper will be open to the public.

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