

Factors affecting users' stickiness in online car-hailing platforms: an empirical study

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Abstract: This study investigated factors that affected users' stickiness and interrelationships among confirmation, perceived usefulness, satisfaction, continuance intention and users' stickiness in online car-hailing platforms. An empirical approach was adopted through online questionnaire survey to find out the formation mechanism of users' stickiness. The results indicated that perceived usefulness and satisfaction were positively associated with continuance intention, thereby leading to the increase of users' stickiness. And perceived usefulness also affected the satisfaction positively. What's more, confirmation was found to be the strongest predictor of perceived usefulness. The findings of this study may not only verify the extended model of IT continuance, but provide managerial guidelines for online car-hailing platform, thereby enhancing users' stickiness.

Keywords: car-hailing platform; users' stickiness; affecting factors; empirical study; managerial guidelines.

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1 Introduction

With the popularity of the internet and the wide application of smart phones, car-hailing software based on mobile Internet technology has become popular in China. The online car-hailing platform connects the passenger group with the driver group, which is a typical bilateral platform model. In order to attract users and occupy the market quickly, various car-hailing platforms have adopted the strategy of 'burning money' by offering coupons or cash backs to customers. After intense capital and market competition, the outline of online car-hailing markets has basically formed today. Due to the overlap of the business scope in car-hailing platforms and the low conversion cost of users in the Internet environment, a small inconvenience would result in a sharp drop in users' satisfaction. And many users would shift to other car-hailing platforms. At this time, a car-hailing platform should not only consider attracting the users, but also consider how to improve the users' stickiness and cultivate customer loyalty (Liu, 2015). So, it is very important to identify the factors that affect the users' stickiness on car-hailing platform.

On the research of users' stickiness, different scholars have analysed from different research backgrounds and perspectives. Oliver (1980) confirmed that customers' repurchase intention was related to expectation, perceived performance, confirmation and satisfaction on expectation-confirmation theory (ECT). Bhattacharjee (2001) applied the ECT to the field of information systems and identified constructs that affected the users' intention using the information system continuously, added the factor of perceived usefulness. Lin et al. (2005) introduced the construct of perceived interest to study its impact on the continuous intention of the web portals. However, this stream of research only studied the influencing factors of the users' continuous intention, not extend to the users' continuous behaviour.

Limayem et al. (2007) introduced the construct of continuous behaviour when studying the continuous use of the World Wide Web. Bhattacharjee et al. (2007) extended his model (Bhattacharjee, 2001) to introduce the construct of continuous behaviour, forming the Extended Model of IT Continuance. Fu and Li (2014) based on the research background of tourism virtual community, increasing perceived ease of use and perceived conversion cost factors and proved that those factors were positively correlated with user stickiness through empirical research. Several other scholars have discussed the factors that affect the users' stickiness in other contexts such as mobile payment, group-buying websites, enterprise WeChat (Wen and Li, 2014; Song and Shi, 2013; Yan, 2016). Taken together, there are a lot of literatures on users' stickiness, but there are few researches taking into the background of online car-hailing platform. In addition, the users of the car-hailing platforms have different behaviour characteristics, which have certain influence on the users' stickiness.

The main objectives of this study are to analyse the user behaviour of the car-hailing platform in order to identify the factors that influence the users' stickiness. For the car-hailing platforms, they can start with the factors that affect the users' stickiness and take specific measures based on the characteristics of the company. And the suggestions presented in this paper can also provide guidance for the practice of car-hailing platforms.

The rest of this paper is organised as follows. In Section 2, based on the Extended Model of IT Continuance, the paper constructed a model and made reasonable hypotheses. Then we designed the measurement scales and questionnaire according to the model and then issued questionnaire. In Section 3, we conducted data analysis on the

recovered valid questionnaires. Finally we drew relevant conclusions and discussed limitations and future research opportunities.

2 Theory and hypotheses

2.1 Theoretical background

There are many literatures on the research of car-hailing platform and the stickiness of users alone, but few on the users' stickiness studied in the background of the car-hailing platforms. On the research of car-hailing platform, scholars are mainly focused on the social law and marketing. The research of law perspective involved the identification of legal liability and the countermeasures of legal supervision of car-hailing platforms. The marketing angle is related to the price strategy, challenges and future development of car-hailing software. Wang and Wu (2016) proposed that the car-hailing platform and the driver were neither the employment relationship nor the simple service relationship. The car-hailing platform and the car rental company were a kind of alliance cooperation and the car-hailing platform provided consumers with information services and related payment and settlement services. Hao (2014) proposed to improve the regulations of anti-unfair competition law and anti-monopoly law, so as to avoid unfair competition behaviours of car-hailing platforms using capital advantage. Based on the bilateral market pricing theory, Geng (2015) discussed the equilibrium profit and influence factors of platform under different pricing models. It was pointed out that it was the right direction to differentiate the car-hailing platform. Caillaud and Jullien (2003) put forward that the initial stage of platform development could offer preferential treatment to users on one side of the platform and the growth of the user scale of this side could help the cultivation of users on the other side of the platform. Zhang (2015), taking DiDi taxi as an example, pointed out that DiDi should start from the perspective of future travel ecological chain. And the vision was to build a three-dimensional intelligent transportation system.

The car-hailing platform connects the passenger group with the taxi driver group, which is a typical bilateral platform model. The online car-hailing process can be described as follows: The passenger who has the demand for the car sends the car-hailing request to the car-hailing platform. After the platform receives the order from the passenger, it will send the order to the driver. After the driver gets the order, he will contact the passenger to confirm the location and destination. And the platform will automatically deduct the expense from the bank card account of the passenger. At the core of this process is the car-hailing platform's handling of passenger demand, the delivery of orders to drivers and the docking mechanism between drivers and passengers.

However, if a platform wants to be succeeded, it is not enough to provide simple channels or intermediary services. The key to the operation of platform mode is to create a perfect and sustainable ecosphere (Chen and Yu, 2013). It establishes the precise norms and mechanisms that can effectively motivate all parties to participate in the group and achieve the strategic goal of the platform.

In the behaviour of online consumption, people's behaviour can be divided into two parts: initial using and continuous using. Initial using is a problem of users' attraction and users' continuous using is the problem of stickiness. Traditionally, ECT and Expectation-Confirmation Model of IS Continuance concern only with the users' continuance intention. However, the Extended Model of IT Continuance is a model of the

users' continuous behaviour of information system. And it has empirically evaluated the strength of this association.

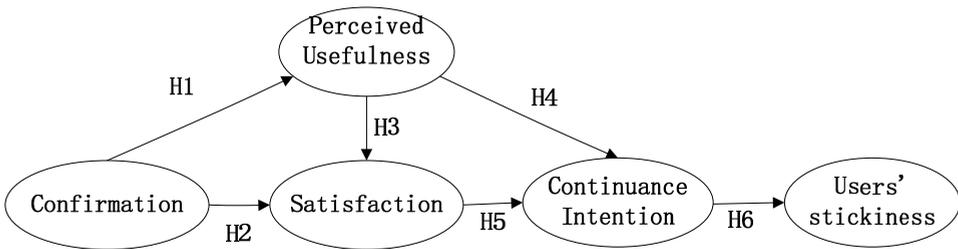
According to the Extended Model of IT Continuance, confirmation was positively impacting perceived usefulness and satisfaction. Perceived usefulness and satisfaction were positively related to user continuance intention. Especially, users' IT continuance intention was positively related to their IT continuance behaviour. However, in the IT usage environment, the intention-behaviour association tended to be low to moderate (Davis, 1989). The extended model introduced contingent factors (self-efficacy and facilitating conditions) potentially influencing IT continuance intention and behaviour. Self-efficacy referred to the ability and skill of users to use IT independently and facilitating conditions were the availability of external resources for the user. Empirical research proved that the IT self-efficacy positively affected the continuous intention; facilitating conditions positively affected the continuous user behaviour.

2.2 User stickiness model

Based on the Extended Model of IT Continuance, this paper establishes a theoretical model. The research object of this paper, online car-hailing platform, can also be seen as information system in a certain conditions. And stickiness emphasises internal or external motivations of the users to produce a consistent using of products or services (Chen and Yu, 2013). To some extent, users' stickiness depends on their continuous behaviour. Therefore, taking An Extended Model of IT Continuance as the basis theory of this paper has certain rationality.

Basic theoretical model has cancelled the relationship between perceived usefulness and satisfaction, but other scholars through the empirical study have proved that there is a significant positive correlation between perceived usefulness and users' satisfaction (Zhao et al., 2012). Given the perceived usefulness is the correction of confirmation, so the paper joined the relationship between perceived usefulness and satisfaction in the model. In the basic theoretical model, IT self-efficacy mainly referred to the degree that users can use information system independently. And the car-hailing software is simple and easy to use. At the same time, the platform is mostly used by young people, which use the car-hailing software like a duck to water. So the model cancelled IT self-efficacy variable. In the basic theoretical model, the facilitating conditions mainly referred to one's perceived control over external resources needed (e.g., organisational, technological) to perform that behaviour (Ajzen, 2012). However, the car-hailing platform has a different characteristic from other platforms – the user will only come because of 'demand' over a given period of time. That is to say, car-hailing passengers use the software only when they have car-hailing requirements, which is independent of organisation or technology (Chen and Yu, 2013). So the model in this paper cancelled the facilitating conditions variable. In conclusion, the influencing factors in the final theoretical model were determined as confirmation, perceived usefulness, satisfaction, continuance intention and users' stickiness.

Through the above analysis, based on the Extended Model of IT Continuance, according to the thought of belief, attitude, intention and behaviours, the paper constructs theoretical model from the perspective of stickiness formation mechanism of a car-hailing platform. The theoretical model is shown in Figure 1.

Figure 1 User stickiness theory model of car-hailing platforms

Oliver (1980) pointed out that the expectation confirmation is the psychological perception after the comparison of pre-purchase expectation and post-purchase performance. In the car-hailing platform, the confirmation can be understood as the comparison between the psychological expectations before using the platform and the performance after using the platform. The users' confirmation degree is higher, indicating the users' perception performance after using the car-hailing platform is higher than the previous expectation. The car-hailing platform is better able to meet the demand of the users. And the user will believe the platform is useful, so the following hypothesis is proposed:

H1 Confirmation is positively related to perceived usefulness.

Bhattacharjee (2001) indicated that the expectation confirmation was positively correlated with user satisfaction by empirical research. After using a car-hailing platform, if the users' confirmation is positive, they will have a positive emotion. That is satisfaction. Therefore, the following hypothesis is proposed:

H2 Confirmation is positively related to user satisfaction.

Davis et al. (1989) pointed out that perceived usefulness reflected the degree to which a person felt using a specific system to improve his work performance. In the theoretical model of the car-hailing platform, the perceived usefulness is defined as the degree to which the user considers a car-hailing platform to meet its travel needs and to improve his or her travel efficiency. When using the taxi software to help users save travel time, improve travel comfort and meet diverse travel needs, users will be more satisfied with the mobile taxi mode (Sha, 2016). And then they will have the intention to continue to use the platform. Therefore, the following hypotheses are proposed:

H3 Perceived usefulness is positively related to user satisfaction.

H4 Perceived usefulness is positively related to user continuance intention.

When Locke and Latham (1990) studied the definition of performance, he pointed out that satisfaction was a positive emotional state that occurs after people's performance was evaluated. Oliver (1980) expanded the definition to the consumer domain. Tan (2016) combined the characteristics of the news recommendation APP to define satisfaction as the level of emotional satisfaction of the user after using the software. The user will generate a positive emotional attitude after using the car-hailing platform. Under the repeated action of the positive attitude, the user will generate the intention to use the car-hailing platform continuously. Therefore, the following hypothesis is proposed:

H5 User satisfaction is positively related to continuance intention.

The continuance intention of the ride-hailing platform is a willingness that users still want to reuse after using the platform. The users' willingness to use the car-hailing platform again will lead to the users' direct use behaviour when they have demand for the car-hailing. Zhao (2017) verified the continued intention of users have a positive impact on continuous use behaviour in the empirical study of mobile travel APP. Therefore, the following hypothesis is proposed:

H6 Continuance intention is positively related to users' stickiness.

3 Research methods

3.1 Sample and data collection

This paper studies the interrelationships among the factors that affect the users' stickiness. Questionnaires were used to collect data. Those who used more than one times of a car-hailing platform were selected as the subjects to answer questionnaires in this study. And the questionnaires were distributed on the campus and specialised questionnaire platforms. The questionnaire was issued and recycled for half a month and the final recovery was 377. The effective questionnaire was 321, with an effective rate was 85.15%. The number of samples meets the requirements of the structural equation, at least 10 times the total number of the scale items (Bentler, 1987). Among these research subjects, there were 147 males and 174 females. Their ages ranged from 15 to 55 years and most of them are between the ages of 18 and 24. In terms of career, respondents included students (51.09%), political party institutions workers (5.61%), enterprise employees (23.05%), free workers (19.93%), etc. In terms of education, respondents were mostly undergraduate (61.37%) and graduate students (13.09%).

Respondents were asked to answer what car-hailing platforms are the most commonly used, using years and frequency. On the types of the car-hailing platform, 91.13% of the respondents have used DiDi and a considerable number have used Uber, followed by Shenzhou car rental and Yihao car, reflecting the market share of car-hailing platforms to some extent. In terms of years to use a car-hailing platform, most surveyors have used car-hailing platforms for 1–2 years, followed by 2–3 years. For the frequency of use a car-hailing platform, occasional use and less use respondents accounted for the majority, often using only 15.69%.

3.2 Measurement

Measurement scales took a seven-point Likert scale method and the respondents were graded on a scale of 1 to 7 according to the degree of approval of the item, respectively corresponding to 'completely disagree', 'not agree', 'basic disagreement', 'neutral', 'basic agree', 'agree', 'completely agree'. The study constructs involved in the theoretical model of this paper include: confirmation, perceived usefulness, satisfaction, continuance intention and users' stickiness. Confirmation was measured using a 4-item scale developed by Bhattacharjee (2001). The items incorporated actual experience, security, service and total confirmation. The respondents were asked to evaluate the gap between the reality and the expectation after they used online car-hailing platforms. The perceived usefulness items were developed by Sun (2015). The items incorporated timeliness,

efficiency, payment easily and total usefulness. The satisfaction measurement items were adapted from Mummalaneni (2005). The continuance intention items were adapted from Chaudhuri and Holbrook (2002). The users' stickiness items were adapted from Karjaluoto et al. (2012). The measurement scales can be found in Table 1.

Table 1 Measurement scales

<i>Construct</i>	<i>Scale item</i>
Confirmation	CO1 The actual experience of using the car-hailing platform was better than I expected.
	CO2 The security of the car-hailing platform is better than I expected.
	CO3 The service is better than I expected.
	CO4 Overall, most of my expectations have been met by the use of the platform.
Perceived usefulness	PU1 The car-hailing platform can provide the information of the vehicles I need in real time.
	PU2 This platform can improve my car-hailing-hailing efficiency.
	PU3 The payment method provided by the car-hailing platform can easily enable me to complete the payment.
	PU4 Overall, the car-hailing platform is useful.
Satisfaction	SA1 The car-hailing platform met my travel needs.
	SA2 Using the car-hailing platform is an enjoyable experience.
	SA3 Compared with other car-hailing platforms, the platform is more satisfying to me.
	SA4 Overall, I am satisfied with the car-hailing platform.
Continuance intention	CI1 I will continue to use this platform in the future.
	CI2 In the future, I plan to continue using this platform.
	CI3 In the future, I will continue to use the car-hailing platform instead of other platforms.
	CI4 Overall, I'm not going to give up on the platform.
Users' stickiness	CB1 I am a loyal user of the car-hailing platform.
	CB2 The car-hailing platform is the first choice for me to use the car-hailing platform.
	CB3 In the future, I will maintain the long-term use of the car-hailing-hailing software.
	CB4 When talking with others, my evaluation of the car-hailing platform was positive.
	CB5 When asked, I would recommend the car-hailing-hailing app to him.

After the data collection was complete, all scales were further assessed for reliability and validity. Confirmatory factor analysis (CFA) was used to assess the dimensionality of the study scales. A structural equation modelling (SEM) method was then applied to determine how well the research model fit the data and to identify support for each of the hypotheses. All data analyses were performed using AMOS 24.

4 Results

Next, the results of the study were reported to verify whether the interrelationships among the factors affecting the users' stickiness satisfied the previous hypotheses.

Table 2 Reliability and validity analysis of measurement scale

Construct	Scale Item	Item Unstd.	Significance			Std.	I.R. SMC	C.R. CR	C.V. AVE
			S.E.	Z	P				
Confirmation	CO1	1.063	0.077	13.778	***	0.765	0.585	0.857	0.601
	CO2	0.991	0.075	13.208	***	0.735	0.541		
	CO3	1.000				0.805	0.648		
	CO4	1.037	0.073	14.292	***	0.794	0.631		
Perceived usefulness	PU1	1.000				0.773	0.597	0.872	0.631
	PU2	1.049	0.072	14.513	***	0.802	0.643		
	PU3	0.989	0.076	12.969	***	0.724	0.524		
	PU4	1.050	0.067	15.559	***	0.871	0.759		
Satisfaction	SA1	0.864	0.068	12.708	***	0.709	0.502	0.862	0.609
	SA2	1.022	0.072	14.254	***	0.788	0.620		
	SA3	1.000				0.794	0.631		
	SA4	0.990	0.006	14.889	***	0.827	0.683		
Continuance intention	CI1	1.106	0.070	15.815	***	0.838	0.703	0.903	0.700
	CI2	1.172	0.070	16.704	***	0.882	0.778		
	CI3	1.000				0.772	0.596		
	CI4	1.211	0.075	16.079	***	0.851	0.723		
Users' stickiness	CB1	1.000				0.740	0.548	0.896	0.632
	CB2	1.098	0.078	14.007	***	0.798	0.637		
	CB3	1.063	0.076	14.008	***	0.798	0.637		
	CB4	0.999	0.071	14.054	***	0.801	0.641		
	CB5	1.116	0.076	14.649	***	0.835	0.696		

Note: IR = item reliability, CR = combined reliability, CV = convergent validity.

4.1 Measurement model

Quality measurement scales must exhibit reliability and validity (Inman et al., 2011). Reliability refers to the degree of consistency or stability of measurement results. As a result, reliabilities were found to be satisfactory. First, the non-standardised factor loadings of each item were positive and the P value were ***. Then the standardised factor loadings were ranging from 0.709 to 0.882, all above 0.6 recommend by Chin (1998). Next, the item reliability and the combined reliability of the two aspects are tested. SMC was used to measure item reliability and the minimum value of SMC was 0.502, higher than the required minimum standard of 0.36. CR was used to measure combined reliability and the minimum value of CR was 0.857, greater than 0.7 (Hair et

al., 1998). The reliability coefficient of each item in the theoretical model can be found in Table 2.

Validity refers to whether the measuring tool can predict the characteristics of its measurement. There were many types of validity and the content validity and convergent validity of the paper were tested. First, the content validity was found to be satisfactory. Because the measurement scale of this study was compiled after referring to relevant literature and discussing carefully by the instructor and several students. Next, the convergent validity was also satisfactory. Because average variance extracted (AVE) was used to evaluate convergent validity. AVE values (ranging from 0.601 to 0.700) were greater than 0.50 (Fornell and Larcker, 1981). Therefore, validity was achieved. The test results of convergent validity of model are shown in Table 2.

The scales were further assessed within the context of the full measurement model using a CFA methodology (Koufteros, 1999). Results showed that the overall goodness-of-fit values were satisfactory:

$$\chi^2(321) = 524.453$$

$$(p < 0.001), \text{GFI} = 0.865, \text{CFI} = 0.932, \text{TLI} = 0.992, \text{NFI} = .0900$$

4.2 SEM results

Paper used AMOS to evaluate the goodness-of-fit. The measurement model fitted the data relatively well. The CMIN/DF value of 2.866 was less than the 3.00 maximum. The GFI value of 0.865 and a NFI value of 0.900 were below the 0.9 recommended by Abd-El-Fattah (2010). A CFI value of 0.932 and a RMSEA value of 0.076 were all acceptable. Other goodness-of-fit values can be found in Table 3.

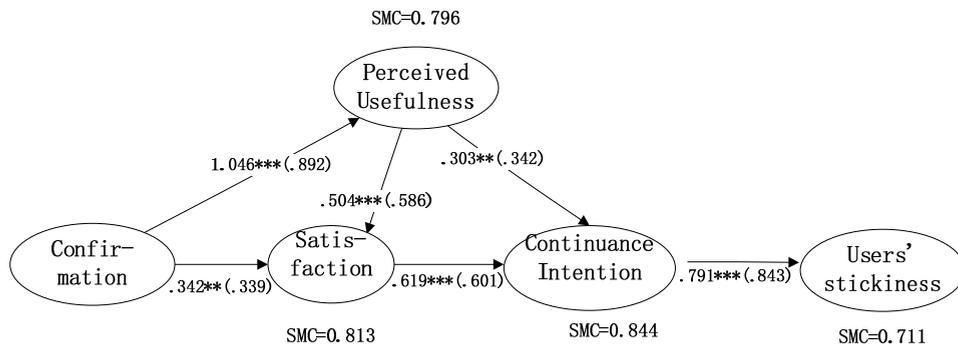
Table 3 Goodness-of-fit values

Fitting indexes	Judgment standard		Model actual value	Fitting effect
	Acceptable	Good		
CMIN/DF	2–3	< 2	2.866	Acceptable
GFI	0.7–0.9	> 0.9	0.865	Acceptable
RMSEA	0.05–0.10	< 0.05	0.076	Acceptable
NFI	0.7–0.9	> 0.9	0.900	Acceptable
CFI	0.7–0.9	> 0.9	0.932	Good
IFI	0.7–0.9	> 0.9	0.933	Good
RFI	0.7–0.9	> 0.9	0.886	Acceptable
SRMR	< 0.08		0.0416	Acceptable

Then, AMOS used the maximum likelihood method to carry out the significance test through the path coefficient and the p value. The six study hypotheses were all supported by the results. The link from confirmation to perceived usefulness (H1) is positive and significant with a standardised estimate of .892 and an associated p-value < 0.001. The confirmation to satisfaction link (H2) is positive and significant with a standardised estimate of .339 and associated p-value < 0.01. The perceived usefulness to satisfaction link (H3) is positive and significant with a standardised estimate of .586 and associated p-value < 0.001. The perceived usefulness to continuance intention link (H4) is positive

and significant with a standardised estimate of .342 and associated p-value < 0.01. The satisfaction to continuance intention link (H5) is positive and significant with a standardised estimate of .601 and associated p-value < 0.001. The continuance intention to users' stickiness link (H6) is positive and significant with a standardised estimate of .843 and associated p-value < 0.001. The SMC value of each endogenous variable (ranging from 0.711 to 0.844) was higher than 0.66 (Chin, 1998). Figure 2 illustrates the model with the SEM results specified in the Amos 24 output.

Figure 2 Results of structural model



Notes: (321) = 524.453 ($p < 0.001$), GFI = 0.865, CFI = 0.932, TLI = 0.992, NFI = .0900, RMSEA = 0.076, SRMR = 0.042. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. SMC measures the extent to which endogenous variables are explained by exogenous variables.

5 Discussions

5.1 Summary of results

Results of the SEM analysis shows that confirmation is positively related to perceived usefulness (H1 supported). Moreover, the path coefficient between the confirmation and perceived usefulness is the highest among all the path coefficients. Because the user will form the expectation before using the car-hailing platform. If the perceived performance after using is greater than the expectation before using, the users' confirmation will rise. Users will perceive the value of the car-hailing platform in various aspects, which will form a new expectation belief, while perceived usefulness is the most appropriate belief factor (Davis, 1989). Therefore, confirmation has a strong positive influence on perceived usefulness. Secondly, confirmation and perceived usefulness both have a positive effect on satisfaction (H2, H3 supported). However, the effect of perceived usefulness on satisfaction is greater than confirmation. Because the expectations of consumers have changed after consumption. The expectation before consumption is mainly based on consumers' ideas and mass media publicity, while the expectation after consumption is generated by consumers' direct consumption experience. Bhattacharjee (2001) replaces the expectation after consumption with perceived usefulness, which is used to adjust the changed expectations. So the perceived usefulness coming from consumption experience has a stronger effect on satisfaction. Thirdly, perceived

usefulness and satisfaction both have a positive effect on continuance intention (H4, H5 supported). The effect of satisfaction on continuance intention is greater than perceived usefulness. Because perceived usefulness also affects the continuance intention through satisfaction. Fourthly, continuance intention is positively related to users' stickiness (H6 supported). The continuance intention of users to the car-hailing platform will directly contribute to the users' continuous use behaviour, which is consistent with the conclusion of the Extended Model of IT Continuance. In conclusion, Overall model fits the data well and supports all study hypotheses specifically.

5.2 Theoretical and practical implications

The theoretical implications this study provided can be seen as follows. With regard to users' stickiness, scholars' researches involve various perspectives, including network shopping, virtual community, healthy journals and other fields. But empirical research on stickiness has been lacking in the case of car-hailing platform. To fill this gap, paper analyses the characteristics of the car-hailing platform and the behaviour of the platform's users comprehensively and provides empirical evidence of positive interrelationships among confirmation, perceived usefulness, satisfaction, continuance intention and users' stickiness. Moreover, the results show that the relationships between users' perceived usefulness and continuance intention are stronger through satisfaction. This point is not proposed by the Extended Model of IT Continuance. This paper's theory model can be said to be the expansion of users' stickiness theory. And it can provide theoretical reference for the further research on the users' stickiness in car-hailing platform.

The findings of study also have several important implications for managerial practice. By identifying the factors that affect the users' stickiness, this study provides a useful strategy for improving the users' stickiness of car-hailing platform. First, this study demonstrates that the increasing of users' actual feeling, platform security, platform service and overall expectation recognition can bring about the increase of confirmation and then improve users' stickiness. Thus, car-hailing platform can improve users' stickiness from these aspects. In terms of security, the car-hailing platform should ensure the safety of the vehicle and the driver: strengthen the entry threshold of the vehicle; perfect the information of the driver; and prevent the black car and the zombie car from entering the platform. Then ensure the safety of the driving process: the information such as users' travel information, get on and get off information, real-time location information can be tracked online. And accidents can be traced effectively. In terms of platform service, the car-hailing platform should improve the after-sales service of the platform; solve the user feedback quickly and effectively; and improve the guarantee after using, so as to improve the expectation confirmation.

What's more, the findings suggest that improving the efficiency of the users' travel is the core of enhancing the perceived usefulness. For the typical two-sided market with 'positive cross-border network effect', the increase of the number of drivers and the efficiency of the driver will improve the efficiency of the travel. And then, selecting the optimal travel path according to the real-time road condition and avoiding the congested roads can also help to improve the travel efficiency. The platform can also improve the functions such as early date car, carpool and driving, so as to meet the needs of different user groups.

Moreover, the results of this study reveals that satisfaction is also an important factor affecting users' stickiness. Accordingly, the car-hailing platform can provide relevant additional services on the basis of meeting the basic travel needs of passengers. For example, the platform collaborates with hotels, restaurants and other cooperation in order to recommend the high cost performance near the passengers' destination. And users can also choose their meals online and consume offline directly. Then, the demographic data of the customer base and the travel trajectory data can exert great value. The platform can set up data warehouse to analyse and mining the relevant data, by subdividing customer groups to provide personalised travel plan and consumption advice for passengers. This is the way to improve user satisfaction.

5.3 Limitations and future research opportunities

Although this paper builds its own theoretical model and suggests some insights into factors affecting users' stickiness, the current study has a few limitations that should be acknowledged. First, the questionnaire survey period is shorter and can not meet the requirement of random sampling totally. Second, the paper identifies five factors, but the factors that affect the users' stickiness may not be the only ones. There are other factors that significantly influence the stickiness of car-hailing platform users. Third, the factors involved in the theoretical model are perceptual variables, which can bring difficulties to quantify and design the scale. There are substitutions between multiple items of the same construct, but they cannot be completely separated. So the discriminant between constructs is not high.

Therefore, more works need to be done in the future. First, the recovery cycle of questionnaires can be appropriately increased. The individual characteristics can be taken into account when analysing the questionnaire. The influencing factors of users' stickiness can be discussed in different geographical location and characteristic groups. Then, in addition to the factors mentioned in the model, the influence of other factors on users' stickiness can be explored. Finally, the constructs can be further refined. For example, the stickiness can be divided into attitude stickiness and behaviour stickiness, so that the definition of the construct can be clearer and the subsequent reference to the enterprise will be more targeted.

6 Conclusions

Based on the Extended Model of IT Continuance and the users' behaviour characteristics of the car-hailing platform, this paper has formed the theoretical model after modify the foundational model. Empirical research reveals that users' stickiness is positively affected by continuance intention. Continuance intention, in turn, is determined primarily by satisfaction and secondarily by perceived usefulness. Further, confirmation also has a significant influence on post-acceptance perceived usefulness and satisfaction, which validates the foundational theory. Especially, perceived usefulness affects the continuance intention positively through satisfaction, which adds up the foundational theory. These findings provide theoretical support for further research and enterprise practice.

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