

Study on Users' Adoption Behavior for Internet Chauffeured Car

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Abstract: Internet chauffeured car (abbreviated as ICC) appears under the background of wisdom traffic. It is one of representatives of the closed-loop O2O mode, but research about its users' adoption behavior is not rich. Our study is based on the user's view. Firstly, we construct a conceptual model about the influencing factors of ICC users' adoption behavior by introducing unified theory of acceptance and use of technology (UTAUT) integrating with perceived risk theory and habit theory. Secondly, we use structural equation model (SEM) to analyze the factors' influencing direct and extent. Results show that performance expectancy, effort expectancy and social influence prompt the formation of ICC users' adoption intention significantly; perceived risk hampers the formation of adoption intention significantly; but the expected inhibiting effect of perceived cost on adoption intention is not significant. As for adoption behavior, facilitating conditions and adoption intention have markedly prompting effect, and habit has notable moderating effect. The results can provide some reference for platforms to promote their service and make related management policies.

Key words: Adoption behavior, influencing factors, internet chauffeured car, UTAUT, habit.

1. Introduction

Internet chauffeured car (abbreviated as ICC) is the mobile booking taxi, which appears in 2012 in China. ICC is one kind of sharing mobile-traffic service based on the technology of LBS. By means of the third party platforms and innovative technologies, ICC can integrate the resources of spare taxies to satisfy users' various traffic need. When using ICC, users can reserve a taxi online and also pay online after consuming the service offline, which then forms a closed-loop O2O mode [1]. This mode can effectively improve the allocation of social resources and realize collaborative consumption. It is the concrete expression of "internet + sharing" economy. Now ICC has been widely accepted in China [2], [3]. Take Didi corp. as an example, which is the most typical application of ICC in China, there are 4 billions active users scattering in over 400 cities on its platform in 2016. Didi reshapes brand new traffic experience for people while meeting their differentiated traffic need.

In July 2016, the ministry of transport and other six departments jointly announced the New Rules for ICC. The New Rules clearly states ICC's legal status. Meanwhile, it elevates the access standards for cars and drivers, which perhaps induces many unstable problems, such as sharply decreasing supply, rising price and then a shrinking market. So, it is an urgent issue faced the supply side of the market to know about users' basic demand and take corresponding measures to maintain and expand the market.

In this paper, factors prompting and hampering users to adopt ICC are studied on the basis of extended

unified theory of acceptance and use of technology (UTAUT) model. ICC is subversion of traditional traffic habits and much private information is involved in the using process. So taking exogenous variables of UTAUT as prompting factors, perceived risk and perceived cost as hampering factors and habit as the moderating factor, we construct a conceptual model of ICC users' adoption behavior. Structural equation model (SEM) analysis is used to implemented empirical research. This study extends the application of UTAUT in m-commerce scenario, and extracts factors influencing users to adopt ICC. This study has essential theoretical and practical values for ICC platforms to timely grasp users' characteristics, and take corresponding management and promotion strategies for customer development.

2. Reference Review

Research about users' adoption behavior of m-commerce has been a hotspot in recent years. Existing research is mostly based on the demand side of the service, that is, from users' view. Related theory involves in theory of rational behavior (TRA), theory of planned behavior (TPB), UTATU, etc [4]. Many scholars have built extended models on the basis of UTAUT and have obtained abundant results. Zhou Tao etc. focus on characteristics of m-commerce technology and concordant TTF and UTATU to study m-bank users' adoption behavior. They find that performance expectancy, social influence, facility conditions and task-technology matching affect adoption behavior significantly [5]. Mobile smart terminals are closely linked to personal privacy information, and it is inevitable to generate cost during use. Thus, perceived risk, perceived cost and trust are all important influencing factors to adoption behavior. Lu etc. study factors affecting users to adopt the mobile payment, and find that perceived cost and perceived risk influence users' adoption intention negatively [6]. Wen Peng etc. study weChat users' adoption behavior. They take into account weChat's media attributes and combine UTAUT with perceived risk theory and media richness to construct the conceptual model; their results show that exogenous variables in UTAUT and risk factors affect adoption intention positively and negatively respectively [7]. Peng Hongxia etc. use the similar model to analyze mobile payment. Their results show that perceived cost and perceived risk has important resistance to the user's adoption, but the expected prompting effect of convenience isn't proved, which is contradict with the UTAUT[8]. This states the effect of convenience should be considered under the concrete environment. Taking into account specific conditions of different application fields, many researchers introduce gender, age, income, experience, education background etc. as moderators when using UTAUT to study the user's adoption behavior [9], [10].

Currently, study on the ICC user's adoption behavior is not rich. The limited research mostly focuses on the legitimacy, operating economics, and discussion on ICC's standardized development from the angle of the laws, regulations and policies [11]. Meng Jian etc. analyze the user's adoption intention of mobile taxi App on the basis of UTAUT and initial trust [12]. Lin Yuchuan integrates technology acceptance model (TAM), innovation diffusion theory (IDT), and TRA together to study the mobile taxi App users' adoption intention too [13]. But intention doesn't equal to behavior completely. Furthermore, their studies pay close attention to the market exploration and start-up stages. However, users and environment are changing. In order to employ precise marketing and target marketing to expand the market, it is essential for firms to grasp influencing factors of users' adoption behavior in a state of rapid advance.

3. Theoretical Basis and Research Hypothesis

3.1. Hypothesis about UTAUT

UTAUT model is proposed on the basis of related TAM research results by Venkatesh, Morris, etc. UTAUT integrates eight theoretical models and has higher explanatory power for user behavior. According to UTAUT, adoption behavior is determined by adoption intention and facilitating conditions; adoption

intention is determined in turn by social influence, effort expectancy and performance expectancy.

As for ICC, adoption behavior refers to users are willing to provide relevant information in accordance with the system requirements to use the service afforded by ICC system, and are happy to recommend it to others. Adoption intention is an important indicator of adoption behavior, and the stronger the adoption intention, the greater the chance of adoption behavior [1], [8].

Hypothesis **H₁**: adoption intention affects the user's adoption behavior positively.

Performance expectancy refers to the expected benefit that can be brought to users by using the ICC service, which is similar to perceived usefulness in TAM. To be specific, performance expectancy refers to the degree to which that ICC can help users in their work and life. Performance expectancy influences adoption intention directly [5], [8], [12]. ICC platform can provide users with comfortable and convenient service. It solves users' problem of traffic while improving their quality of life. Therefore, the higher the performance expectancy is, the stronger the users' intention of using ICC is.

Hypothesis **H₂**: performance expectancy affects the user's adoption intention positively.

Effort expectancy is similar to perceived ease of use in TAM. It is the effort that needs to pay while using ICC system. ICC service can realize order matching, payment and evaluation by means of mobile App. So whether users have basic skills required and whether the App is simple and easy to use will definitely influence users' adoption intention [1], [14]. A simpler and easier system will strengthen the user's first impression and his/her performance expectancy [5].

Hypothesis **H₃**: effort expectancy affects the user's adoption intention positively.

Hypothesis **H₄**: effort expectancy affects the user's performance expectancy positively.

Social influence is the extent to which that an individual feels the influence of surrounding community on him/her. In the era of mobile internet, communities that take human-human interaction and value identification as the core are everywhere, and social influence exists everywhere. People around are so important that their perception of the individual's using the new system and the individual's intention to be loved and accepted by people around together will generate a certain degree of external pressure on him/her, which will urge him/her to comply with the group norm (Fishbein and Ajzen, 1975), and further result in a herd behavior. Adoption intention is then formed. The larger the social influence, the stronger the user's adoption behavior [8], [12].

Hypothesis **H₅**: social influence affects the user's adoption intention positively.

Facilitating conditions is the organization's cooperating situation; it refers to that the individuals feel how the organization supports the system using in such aspects as technology, equipment, etc. Current research results show that facilitating conditions have positive effect on user s' adoption behavior [5], [14]. In the process of using ICC, when people perceive that the system's connection is instant and stable, its operation is reliable, the organization can solve problems in time and fulfill its promises to users actively, they will reassure and adopt the system service zealously.

Hypothesis **H₆**: facilitating conditions affects the user's adoption behavior positively.

3.2. Perceived Risk and Perceived Cost

The concept of perceived risk comes from psychology, which means the uncertainty faced with users in the process of making purchase decisions and the importance of the possibly resulting loss (Bauer, 1960). Current related research show that risk of time, function, finance, body and society account for 88.8 percent perceived risk (Stone Gronhaung, 1993). Here perceived risk refers to that when people use ICC, it is inevitably to input their location, telephone number, and financial information, etc. They will be faced with correspondingly unsafe trouble consequently. All this will hamper users to form adoption intention. The more sensitive the user's perception of risk is, the weaker his/her adoption intention is [9], [12].

Perceived cost is the extra expense that users need to bear when using ICC service, such as fees about the mobile network, communication, peak premium, time cost of waiting, etc. Perceived cost is one of the important obstacles to generated adoption intention. The higher the perceived cost is, the lower the adoption intention is [9], [12].

Hypothesis **H₇**: perceived risk affects the user’s adoption intention negatively.

Hypothesis **H₈**: perceived cost affects the user’s adoption intention negatively.

3.3. Habit

Habit generates from experience. It is the environmentally stable, spontaneous behavior that users gradually form in the process of long-term use [15]. “Habits make things natural”. When individuals adopt some behavior according to their habits, such behavior selection depends less on value assessment. In the user’s traffic case, they will form habits after long-time’s frequent use of ICC. Then their selecting of ICC are not completely due to the platform’s perfect facilitating conditions, or perfect technology and other guarantees; on the other words, weaker adoption intention and guarantees can direct stronger adoption behavior. Habit strengthens the influence of users’ previously formed cognitive intent on his/her adoption ICC. So, habits have moderating effect on adoption behavior [15].

Hypothesis **H₉**: Habit strengthens facilitating conditions’ influence on the adoption behavior.

Hypothesis **H₁₀**: Habit strengthens adoption intention’s influence on the adoption behavior.

3.4. Conceptual Model

The basic model of this study is UTAUT. According to the result of literature review and the ICC case, take the four exogenous factors in UTAUT (that is, performance expectancy, effort expectancy, social influence and facilitating conditions.) as influencing factors that prompts users to adopt ICC; take perceived risk and perceived cost as influencing factors that hampers users to adopt ICC; take habit as the moderator. The conceptual model of ICC users’ adoption behavior is then constructed (see Fig. 1).

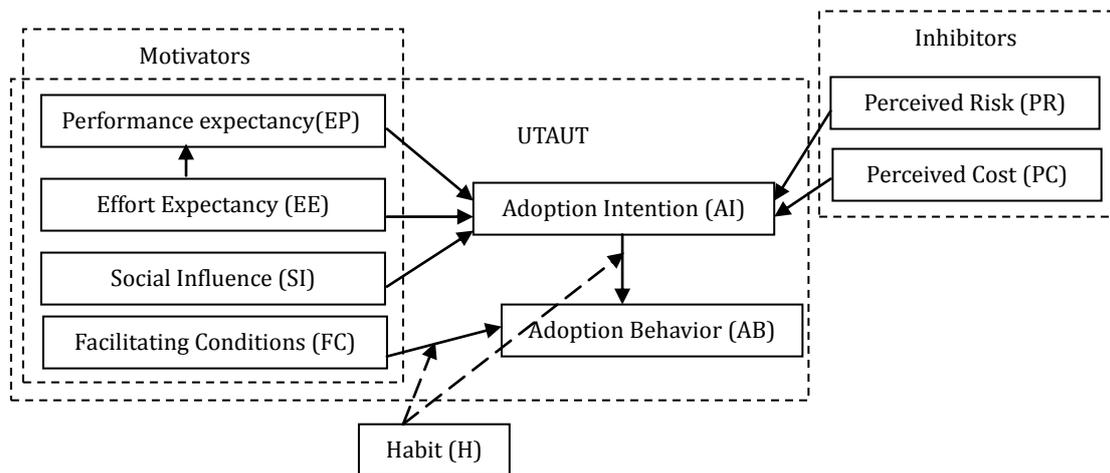


Fig. 1. Conceptual model of the ICC user’s adoption behavior.

4. Research Method

4.1. Scale Design

Firstly, an initial scale is constructed based on existing research results after organizing related references at home and aboard to ensure the reliability and validity; secondly, statements of some measurements are modified according to the specific ICC application while keeping their original meanings

unchanged; thirdly, the scale is pretested in different social groups through online and offline ways. At last, the final scale about the influencing factors of ICC users' adoption behavior is formed after analyzing results of the above recovery. There are 29 measurements altogether. Items EP, EE, SI FC, AI and H all have 3 measurements, which come from references [16]-[20] respectively; UB has 2 measurements, which come from reference [19]; PR has 5 measurements and 3 of them come from reference [21], other 2 are new ones set according to ICC scenario; PC has 4 measurements and 3 of them come from reference [21], 1 is new set according to ICC scenario. This scale is measured by Likter5 method. Each item's options from left to right are strongly disagree (1 point), less disagree(2 points),half agree (3 points), mostly agree (4 points) and strongly agree (5 points).The detailed scale is shown in Table 1.

4.2. Data Collection

This scale is release by wenjuan.com online and collects data through social network media, such as weChat circle of friends, QQ groups, discussion groups, etc. The investigation spans about 7 months which begins on July, 7, 2016 and ends on Feb. 20, 2017. There are total 593 questionnaires are collected and 551 effective ones are retained after eliminated 42 unqualified ones which are answered incompletely or have obvious mistakes. The effective rate is about 92.92 percent. Characteristics of the effective sample are shown in Table 2. The proportion of male is a bit less than that of the female, which are 48.64 percent and 51.36 percent respectively; 93.28 percent of the responders are between 20 and 49 years old. Those below 20 or above 50 years old are fewer, which proportion reaches 6.72 percent only.

Table 2. Characteristics of the Effective Sample

Gender (%)		Age (%)				
male	female	<20	20-29	30-39	40-49	>=50
48.64	51.36	3.63	22.32	37.75	33.21	3.09

4.3. Statistical Data Analysis

Firstly, SPSS 17.0 is used to conduct reliability analysis. The Cronbach's alpha value of the overall questionnaire is 0.961 and every factor's Cronbach's alpha value is above 0.7, which means that the questionnaire has good reliability. Secondly, SPSS17.0 is used to implement Bartlett Sphere test. The KMO of the sample reaches 0.952 and is significant under the significant level of 0.001, which means the scale is suitable for factor analysis. 7 factors are extracted through principal component analysis with a cumulative percent of variance of 85.818%. All indexes' weights corresponding to their factors are more than 0.7, while cross variables' factor weights are all less than 0.5. All variables' AVEs are equal or more than 0.5; all correlation coefficients between factors are less than the square roots of AVEs. These mean that the scale has good convergent validity and differentiated validity (see Table 3).

Table 3. Cronbach's Alpha, CR, AVE and Its Square Root of Factor; Correlations between Factors

	Cronbach's Alpha	CR	AVE	EP	EE	SI	FC	RP	CP	AI	UB
EP	0.938	0.747	0.500	0.704							
EE	0.854	0.751	0.501	0.674	0.708						
SI	0.857	0.749	0.501	0.471	0.367	0.707					
FC	0.861	0.747	0.502	0.226	0.375	0.254	0.705				
RP	0.915	0.833	0.501	0.157	-0.046	0.011	0.062	0.707			
CP	0.869	0.800	0.500	0.067	-0.083	0.032	0.035	0.683	0.707		
AI	0.897	0.750	0.500	0.472	0.157	0.059	0.136	0.007	0.02	0.707	
UB	0.802	0.667	0.501	0.218	0.276	0.269	0.011	-0.144	0.163	0.128	0.708

Note: the bolded numbers on the diagonal are the square roots of AVEs.

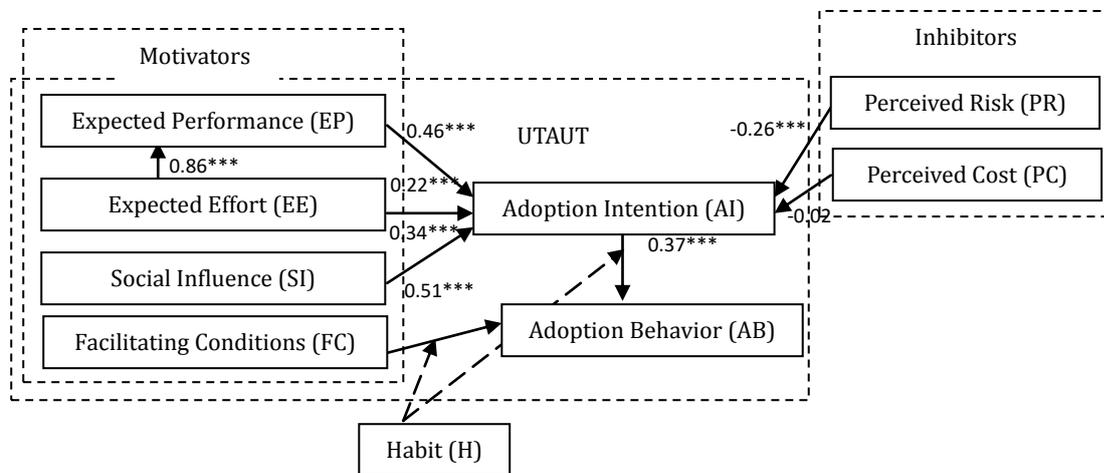
Finally AMOS17.0 is used to test measurement variables and the hypothesis model. The model's overall fit indexes are shown in table 4. In addition to the values of RMSEA and χ^2/df fall in the acceptable range, other parameters' values are all in the ideal scope, which means that the model fitting is good. Standard path coefficients between variables are obtained after path analysis (see Fig. 2). All coefficients are significant at 0.001 significant level except for the value between perceived cost and adoption intention. Then hypotheses H_1 to H_7 are confirmed.

Table 4. Indexes of the Model Fit

Fit indexes	Ideal standard	Acceptable standard	Results in this study
χ^2/df	≤ 2.00	≤ 3.00	2.432
RMSEA	≤ 0.05	≤ 0.08	0.066
GFI	≥ 0.9	≥ 0.8	0.876
AGFI	≥ 0.8	≥ 0.7	0.844
NFI	≥ 0.9	≥ 0.8	0.919
CFI	≥ 0.9	≥ 0.8	0.941

Table 5. Moderating Effect Analysis of Habit

	Model I		Model II		
ΔR^2	0.004		ΔR^2	0.022	
Sig.	0.032		Sig.	0.000	
	β	Sig.	β	Sig.	
AI	0.259	0	FC	0.300	0
H	0.513	0	H	0.520	0
AI*H	0.076	0.032	FC*H	0.179	0



Note: ***, **, * represents $p < 0.001$, $p < 0.01$, $p < 0.05$ respectively.

Fig. 2. Model analysis results.

4.4. Moderating Effect Test

Hierarchical regression analysis is done by SPSS 17.0 to test whether habit has moderating effect on adoption behavior. We take adoption intention and facilitating conditions as independent variables, habit as the moderating variable, and adoption behavior as the dependent variable. In the first place, all variables are centralized; in the second place, construct the product of independent variable and moderating variable respectively; at last, hierarchical regression analysis is performed. If ΔR^2 of the regression equation is significant, or the correlation coefficient of the cross term (that is, the standardized β of SPSS output) is

significant, then the moderating effect exists. The regression results in this study show that facilitating conditions, adoption intention and habit all influence adoption behavior significantly (see table 6), which further verifies H_1 and H_6 . It also indicates that the moderating effect analysis about habit is proper. The β value of AI*H is 0.076 (Sig. <0.05) manifests that H enhances AI's prompting effect on adoption behavior significantly; the β value of FC*H is 0.179 (Sig. <0.001) shows that H enhances FC's prompting effect on adoption behavior significantly.

Table 6. Moderating Effect Test

Mode I		Model II			
ΔR^2	0.004	ΔR^2	0.022		
Sig.	0.032	Sig.	0.000		
	β	Sig.	β	Sig.	
Adoption Intention (AI)	0.259	0	Facilitating Conditions (FC)	0.300	0
Habit (H)	0.513	0	Habit (H)	0.520	0
Adoption Intention * Habit (AI*H)	0.076	0.032	Facilitating Conditions * Habit (FC*H)	0.179	0

5. Discussions and Implications

5.1. Research Results

Performance expectancy is the strongest indicator of adoption intention with the standardized weight of 0.46. ICC has obvious advantages, such as higher efficiency and more comfort, etc. when users are aware that ICC can shape a brand new upgrade experience while solving their rigid transit problem, their adoption intention will be strengthened. Social influence is the second indicator of adoption intention with a standard weight of 0.34. This indicates that people need to refer to the attitude of important others around to decide whether to accept new things because of lack of their own experience. If community members have positive cognition about ICC, users' adoption intention will be enhanced. Effort expectancy can impact adoption intention directly as well as indirectly through performance expectancy. This shows that an easy-to-use ICC App will reduce the complexity of users' perception about the operating process, and further enhance performance expectancy and adoption intention.

Facilitating conditions is the first indicator of adoption behavior with a standardized weight of 0.51. This means although adoption intention is important to form adoption behavior, it doesn't equal adoption behavior. Safety and reliability of the system access, perfect feedback and service system will help to enhance users' perception of the ICC's value, thus contribute to adoption behavior.

Perceived risk hampers the formation of adoption intention. Users' uncertainty about ICC in privacy protection, information security, and possible loss accompanying with it will improve their level of risk perception. The stronger the risk cognition is, the more hesitate to try, the lower the adoption intention is.

Perceived cost impacts adoption intention insignificantly. This may be because current ICC mainly solves users' rigid demand of traffic. In most circumstances, the cost of ICC (such as car-sharing) is even less than that of the traditional taxi. Fees of traffic and calling haven't caused extra cost burden on users.

Habits have obvious moderating effect on the formation of user's adoption behavior. When a user is accustomed to ICC, habits will significantly enhance the motivating effect of facilitating conditions and adoption intention on adoption behavior. Therefore, it is of great significance to change users' travel habits.

5.2. Practical Implications

- 1) Providing the core product and service needed by users is essential. Now everyone is the media. ICC platforms can use word of mouth, content marketing, etc to let users perceive the ICC's usefulness.

They can convey emotional stories about ICC by text, image, video, audio and other forms. The convey channels may be weChat, microblog, and so on. In the process of reading content, users can achieve emotional resonance and gain a strong community belonging sense while obtaining valuable information. Then people unfamiliar may collide with each other due to the content, and experience the usefulness of ICC simultaneously.

- 2) Simplify the operation and decrease the complexities of the ICC App. Overwhelmed by vast mobile Apps, users are tired of choices. Tedious operation and delayed response will make people feel bored and even escape. So platforms should enhance users' experience through the system's ease of use, and strengthen their awareness about the system's performance, so as to enhance their adoption intention.
- 3) Make users trust on the ICC App by providing technology support, system feedback and solving problems in use timely. ICC platforms can advertise reliability, stability of ICC service and convey the image of commitments through a variety of marketing channels to improve the publicity and reputation. All this would leave potential customers a good image, which would further prompt them to use related services.
- 4) Adopt effective measures to perfect ICC service, strictly regulate ICC drivers' behavior, and enhance the system security in many ways to reduce the concerns of the user. The purpose is to reduce the degree of risk perception, thus form adoption behavior.
- 5) Break users' traditional traffic habits and foster their mobile-network transit habits. ICC platforms could take a variety of ways to attract users to try new services, such as recommendations in circle of friends, reward to new users, etc. When users form the internet traffic habit, the influence of adoption intention and facilitating conditions on adoption behavior will be enhanced.

5.3. Research Limitations and Prospects

This research adopts the cross-section data to inquiry the influencing factors of ICC users' adoption behavior. But users' perception of using ICC will change accordingly with the accumulation of experience and the change of the environment. So future research should continue to focus on the change of users' adoption behavior over time, explore the related influential factors and their acting mechanism of users' continuance acceptance.

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