Drivers' Usage Intention and Influencing Factors of Mobile Terminal Carload Application

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Abstract. Mobile Terminal Carload Application has opened a new chapter for the history of road freight industry with the help of the Internet and smart phones. Driver's intention of using Mobile Terminal Carload Application is also becoming a new issue faced by the logistics service providers. This paper analyses the user intention, attitude towards use and the related perceived task technology fit, perceived ease of use, and perceived security risk towards the Mobile Terminal Carload Application and the interrelationships among these factors. On the basis of theory and literature research, a hypothesis model was established for the driver's intention and related factors for using Mobile Terminal Carload Application. Through the investigation of truck drivers in logistics parks in Beijing and the analysis of the structural equation model (SEM), we prove some important hypotheses such as " the perceived task technology fit of Mobile Terminal Carload Application has a positive impact on drivers' attitude towards use", and "the perceived security risk of Mobile Terminal Carload Application has a negative impact on drivers' attitude towards use". According to this, this paper gives two suggestions to the company operating this Mobile APP to help them improve the drivers' user intention: one is to provide the salesmen with the necessary training to install the APP guide, which can improve significantly service quality and promote the drivers to install the APP; the other is to strengthen the protection of driver's privacy information and then enhance their sense of security, so that drivers may use the APP.

1. Introduction

The 41st China Internet network development state statistical report issued by the China Internet Network Information Center (CNNIC) in January 2018 showed that as of December 2017, the number of Internet users in China reached 753 million. The proportion of users using mobile phones to access the Internet accounts increased from 95.1% in 2016 to 97.5% [1]. According to the data, mobile commerce transaction by Internet users is growing rapidly [2].

However, the situation that freight drivers and the cargo can't match well in logistics market occurs frequently in China, which seriously hinders the growth of driver's income and the development of the traditional logistics industry. Since 2014, Mobile APPs of Road Freight Transportations have mushroomed. With the rise of mobile APPs, a number of electronic platforms have been built as bridges between drivers and shippers. To a certain extent, the mobile APPs help people to solve the problems of high rate of empty driving, high logistics costs and other issues caused by information asymmetry in logistics activities.

2. Literature review

In behavior researches of people using technology, researchers often use the Technology Acceptance Model (TAM) to study on the impact people' attitudes of use and user intention in terms of perceived usefulness and ease of use. Although the TAM model is widely used, the model is a one-way model from a technical perspective and does not consider the influence of the interaction between the technology and the task on the use of technology [3]. Different from the TAM model, Task-Technology Fit (TTF) model proposed by Goodhue [4] takes the correlation between tasks and technologies as the starting point, and Goodhue studies the people's technology using behavior from the perspective of "matching". This perspective enables the TTF model to analyze the people's evaluation of the technology from a perspective of maximal profit. That is, the user evaluates the cost-effectiveness of the technology according to the matching between the task and technology, and then adjusts his using behavior. The TTF model is also applied to the field of mobile technology. A case study conducted by Gebauer and Shaw[5] on mobile auction activities found that the most valuable technical functions for driver users are notification and simple transaction support. The driver users have a higher user intention for the mobile auction system with better performance in these two aspects, that is to say, the better the matching of the task and technology is, the higher user intention of the driver is. Lee and Cheng et al. [6] also found that insurance salespeople most want the mobile support system to provide quick information search and tax calculation functions. The mobile support system that can provide these functions is obviously more popular with salesmen. For the Mobile Terminal Carload Application, the drivers' most valued function is to obtain enough revenue.

Although Gebauer and Shaw [5], Lee and Cheng et al. [6] have confirmed the effectiveness of TTF model in the mobile technology acceptance field, there is further in-depth study about how the TTF model has an impact on use of mobile technology in freight field [7]. In fact, task-work matching is an important external factor in perception of driver's behavior. In other words, TAM model and TTF model are complementary in interpreting the use of technology. So a more comprehensive understanding of driver's use of new technology can be achieved. For instance, Dishaw and Strong [8] have proposed that the integration of TAM and TTF can better explain the driver's user behavior to information technology.

Perceived risk theory was originally extended from psychology by Bauer of Harvard University [9]. The uncertainty of the results implied in the consumer purchase decision is the risk. Perceived risk is widely used in the study of consumer decision-making behavior after raised. Gao and Sheng [10] found that perceived risk indirectly influenced individuals' user intention by affecting the attitude of use. Multiple empirical studies have shown that perceived risk negatively affects attitude of use. As a result, perceived risk theory can be used in conjunction with TAM model to study on driver's mobile APP usage behavior. Due to disagreement with the division of perceived risk dimensions, there are also significant differences in the measurement items of perceived risk in the academic community. For example, Hassan et al. [11] classified perceived risk into eight categories: financial, functional, time, social, psychological, physical, source and privacy. Kleijnen [12] divided the perceived risk into three categories: financial, performance, and security. Considering network security problem, the leakage of driver's privacy will become more possible after the installation of the mobile APP. Moreover, the driver is afraid to lose more because of information leakage, such as financial loss and personal safety. Therefore, this paper will focus on perceived security risk in the model.

3. Research model and hypothesis

To study on the driver's user intention of the Mobile Terminal Carload Applications, we plan to analyze the associated constructs, such as perceived task technology fit, perceived ease of use, perceived security risk and attitude of use, and in the era of mobile Internet, the interrelation between the driver's user intention and related constructs and the ways in which they affect each other.

When the technology matches the task well, this technology will become a driver's powerful assistant, and the driver is willing to use the technology. According to the work of Dishaw and Strong[13] we know that the higher the matching degree between technology and task is, the lower the cost that the driver have to pay for finishing the task is and the higher the return he gets is. Therefore, driver users have a

higher user intention for the specific technology that brings higher cost performance. Hence, the following hypotheses are proposed:

H1: Perceived task technology fit positively influences driver's attitude of using Mobile Terminal Carload Applications

Security risk can be defined as threats to the destruction of network data and resources caused by potential environments, conditions and time. These threats include data leakage, modification, waste, and abuse.

The Mobile Terminal Carload Application needs to be bound with the driver's bank card, so personal information, bank card and credit card information may be stolen by the network hacker. The security risk of the Mobile Terminal Carload Application is currently on the client side, and personal information is leaked due to using a mobile phone or a computer that has a Trojan installed. In addition, when mobile electronic devices such as mobile phones are lost, driver's personal information may also be revealed. The higher the driver's perceived security risk is, the lower the affirmative attitude towards Mobile Terminal Carload Application is. Hence, the following hypothesis can be proposed:

H2: The perceived security risk negatively influences on driver's attitude of using Mobile Terminal Carload Applications

We only propose confirmatory hypothesis about classical TAM in this study.

H3: Perceived ease of use positively influences on driver's user intention of Mobile Terminal Carload Applications

H4: Attitude of use positively influences on driver's user intention of Mobile Terminal Carload Applications

We develop a theoretical model in Figure 1 based on the above relationship hypotheses and related constructs analysis.
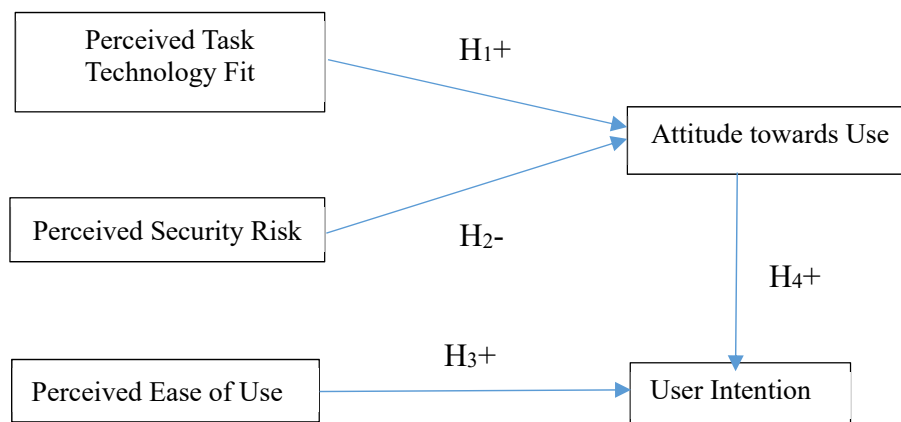

Figure 1. Research model

4. Research method

In order to test the theoretical model, a survey questionnaire was designed and conducted according to the constructs proposed in the previous paper, each question item is referenced from the tested scale in the literature.

The questionnaire used a seven point Likert-type scale, with each measurement variable ranging from 1 to 7. We conducted field research to obtain the data in logistics parks in Beijing. A total of 147 truck drivers were surveyed, of which 130 were complete and valid, with a total 88.43% effective rate.

The reliability test method commonly used in Likert-type Scale is Cronbach's α coefficient. In this paper, the five variables of TTF, PEU, PSR, AU, UI are calculated and the alpha coefficients of entire scale are respectively 0.657, 0.671, 0.610, 0.796, 0.759 and 0.865, which are all above 0.6, indicating that the measurement items of each factor and the entire scale have internal consistency and are more reliable. In the paper, we use SPSS and get the result that the KMO value of the entire scale was 0.682>0.50, and Bartlett's test was 0.000<0.001, which ensured better scale validity.

A first-order confirmatory factor analysis (CFA) was conducted on questionnaire data using LISREL8.70 where the factors were assumed to be relevant. The analysis results are shown in Table 2, the model fit indices Chi-Square=392.09, df=340, RMSEA=0.034, NNFI=0.91, CFI=0.92, IFI=0.92, and GFI=0.82. According to standard recommended by Bentler [14], model fit indices of the observed variables are acceptable. The standard factor loading (SFL) of each measurement problem item is shown in Table 2, and the T-stats ranged from 2.15 to 7.18, $p<0.01$, indicating that the measurement model has good validity.

Table 1. Loads of Observed Variables

Problem item	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11
Loads	0.51	0.36	0.33	0.31	0.40	0.31	0.58	0.39	0.26	0.56	0.27
Problem item	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22
Loads	0.49	0.34	0.34	0.57	0.44	0.38	0.23	0.62	0.45	0.24	0.21
Problem item	Q23	Q24	Q25	Q26	Q27	Q28					
Loads	0.45	0.63	0.54	0.78	0.56	0.35					

5. Model analysis

In order to test the hypotheses in the model of Figure 1, we use LISREL8.70 for verification. Fit indexes are reported as follows: Chi-Square=390.777, df=343, RMSEA=0.0322, NNFI=0.914, CFI=0.922, IFI=0.926, GFI=0.820. According to the criteria recommended by Bentler [14], the fit degree of whole model is acceptable.

From the test results shown in Table 2, hypotheses have been supported by the data model and passed the test under the higher confidence level.

Table 2. Hypotheses test results

Hypothesis	Coefficients	t-stats	Support
H1:TTF-AU	0.61	3.74**	Yes
H2:PSR-AU	-0.16	-1.99*	Yes
H3:PEU-UI	0.51	4.74**	Yes
H4:AU-UI	0.20	2.05*	Yes

Note: *: $p<0.05$, **: $p<0.01$

From the point of TTF and TAM integration, perceived task technology fit has a positive influence on user's attitude towards Mobile Terminal Carload Application. If some customized functions, e.g. the matching function, provided by the Mobile APP can meet the driver's working needs, the APP can really improve the driver's working efficiency. As a result, the good performance because of usage will stimulate more drivers to use this mobile APP.

Perceived security risk has a negative influence on attitude of use, which in turn significantly affects user intention. This shows security is the core concerns of drivers. Although there are digital certificates and various encryption technologies, there still leave some space to leak driver's private and business information. Moreover, the drivers will be particularly cautious when they choose to use the Mobile APP because it requires drivers to bound the APP with ID card, debit card and vehicle information.

6. Conclusion

Empirical studies have found that a significant positive factor affecting driver's attitude of using Mobile Terminal Carload Applications is perceived task technology fit and the significant negative factor is the perceived security risk. The significant positive factor affecting user intention to use Mobile Terminal Carload Applications is perceived ease of use. Here, relative to perceived security risk, the driver is more concerned with perceived task technology fit, that is, they can use the Mobile Terminal Carload Application to obtain more cargo delivery times, thereby improving their own revenue.

The income of the driver using the Mobile Terminal Carload Application depends on the source of goods, and quality freight is the basis for the company to obtain a good return. The Mobile Terminal

Carload Application enterprise should strongly support the work of salesman to promote the owner's APP installation to gain the favor of the driver users. In addition, if we want to attract more groups of drivers, we should also strengthen the protection of driver's private information. In particular, it is significant to improve the safety measures of mobile phone clients and protect the privacy of driver users. Thereby, we can achieve the goal of striving to reduce driver's perceived security risk in mobile APP.

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