

User Behavior Research of Information Security Technology Based on TAM

Wang Cheng¹ and Wang Shi-bo¹

¹*School of Economics and Management of Qiqihar University, Qiqihar, 161006,
China*

Abstract

By analyzing the present applying situation and influential factors of the information security technology, considering technological utility, cognitive cost, social impact, individual innovation, computer self-efficacy and other external variables, this paper constructs a model of user behavior of information security technology based on TAM. Through questionnaire to collect data and SPSS to perform reliability analysis, validity analysis, correlation analysis and regression analysis, the model in this paper is verified to be effective. Finally, some relative recommendations for the development of Chinese information security technology are put forward.

Keywords: TAM, Information Security Technology, User Behavior, Reliability Analysis, Validity Analysis

1. Introduction

The rapid development and wide application of IT technology in social and economic life make people's dependence on network information system stronger and stronger and the demand of network information security technology is increasingly stronger at the same time. Whether information security technology system, a kind of social technology system, could achieve success is not only decided by its advancement and specialty, but also depends on user's recognizing and accepting attitude [1]. From the point of user's behavior this article analyzes factors of the application of information security technology thoroughly, finds the relation between each factor and user's behavior and is very significant for the design and practical use of information security technology.

Model of TAM is a kind of widely applied technology-accepted model, put forward by Davis and mainly used to explain and forecast people's accepting attitude to information technology. In the model of TAM, the adopted behavior of individual users of a certain information technology is decided by their applying intention, and the applying intention is decided by applying attitude, and the applying attitude is decided by the sense of usefulness and simplicity, and the sense of usefulness is decided by external variable and sense of simplicity, and the sense of simplicity is decided by external variable [2]. After the emergence of the model of TAM, it experiences a continuous development of such TAM2 [3], UTAUT [4], etc., which are widely used in many fields. By taking the model of TAM and related theory as an example, this article performs research on user's behavior of information security technology in China and provides relevant solutions.

2. Present Situation Analysis of Information Security Technology

Current situation of application of information security technology: According to a report on netizens network information security situation in China published in March, 2011, the understanding of information security technology netizens of China is ambiguous presently. Half of the netizens who received investigation cannot distinct the function and application of different kinds of information security technology, of which

the reason is that the function of different information security technology production is increasingly stronger and stronger and overlapping partly and additionally its specialty is stronger for common users which makes users' understanding and choosing disparate and unable to fully protect from threaten of different kinds of information security. When users purchase and choose information security technology, evaluation of friends is the main referential factor; secondly price is important factor for ordinary people; the function and practical protection effectiveness is also essential; moreover, information security technology easy to setup and operate will win more popularity. Meanwhile, the report shows that more than 90% investigated netizens express that they will use information security technology, while the reason that they don't know how to use is the most important one among reasons for those who don't use any information security technology [5]. From this we can see, easy to operate and use is the concentrated problem of future information security technology research.

Influential factors of information security technology: Based on the above analysis and researching result of related documents, this article thinks that the influential factors of applying information security technology is as follows:

Perceived usefulness: Perceived usefulness is subjective evaluation result of users considering that one technology which is useful and economical for them that will bring about using intention. Perceived usefulness has been tested by scholars that it'll influence user's using intention.

Perceived ease of use: Users' perceived ease of use is that whether a technology is easy to use for individual users. Ease of use of information security technology is one of the main factors that influence user behavior.

Social impact: That is to say the influence to individual behavior by surrounding groups and environment [6] such as family, friends, colleagues and even network forums as well as network society-the virtual groups. Social impact is similar to TRA [7],TPB[8] and the main regulation mentioned in TAM2, innovative public image of scattering theory and meaning social factor of social cognitive theory. Model in this article considers that factors of social impact influence user's intent to use.

Technology utility: Technical effect is to say the practicability of a certain technology that users feel. Technical effect will be included when choosing information security technology, which presents the distinct and effective function of the information security technology and, moreover, will influence using intention of users. Therefore, along with the increase of cognitive value people feel about technology, technology utility will impact cognitive practicality and using intention of users [9].

Cognitive cost: Economic and cost intention is always the focus of information technology adoption research, and cost is usually one of the main influential factors of adoption behavior. Users hold different accepted attitudes to prices put forward by information security technology service suppliers and cognitive cost has negative influence to using intention.

Individual innovation: Individual innovation is the level of individual user accepting new thought and making decision of innovation, also, it means individual innovation ability which is adopted earlier compared to others in social system. Individual innovation will inspire individuals to learn new operating means, using this technology, search for more technical functions and it is beneficial for cultivating using habits. The higher the individual innovation, the more popular information security technology is applied [10].

Computer self-efficacy: Computer self-efficacy means self-cognition of ability of using computer to achieve goals. Computer self-efficacy is not simple secondary task, such as formatting computer disk, but is related to a judgment on whether this ability can be used into wider field of tasks. It is believed in this article that during the accepting process of information security technology, computer self-efficacy has positive influential relation with cognitive ease to use.

3. Model of User Behavior of Information Security Technology

Model construction: According to the above analysis, based on the original TAM model, this article adds variables of technology utility, perceived cost, social impact, individual innovation, computer self-efficacy and so on, and constructs user behavior model of information security technology, shown in Figure 1.

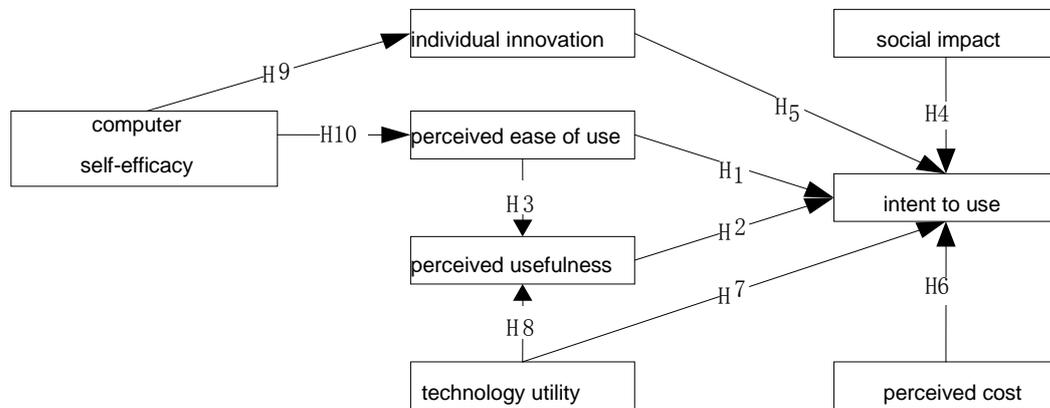


Figure 1. Information Security Technology User Behavior Model

Model hypothesis:

- H1:perceived ease of use has positive influence on user's intent to use;
- H2:perceived usefulness has positive influence on user's intent to use;
- H3:perceived ease of use has positive influence on user's perceived usefulness;
- H4:social impact factors has positive influence on user's intent to use;
- H5:individual innovation has positive influence on user's intent to use;
- H6:perceived cost has negative influence on user's intent to use;
- H7:technology utility has positive influence on user's intent to use has positive influence on user's;
- H8:technology utility has positive influence on user's information security technology perceived usefulness;
- H9:computer self-efficacy has positive influence on individual innovation;
- H10:computer self-efficacy has positive influence on perceived ease of use.

Variable measurement indexes: Based on study scale of former documents and combined with practical condition, this section formulates value measurement scale and explains measurable items of each variable, which is shown in Table 1.

4. Empirical Analysis

This article uses questionnaire method to collect data and tests effect of hypothetical model in the research by detecting single object. During the process of research, there are 130 people taking part in the research in which there are 118 valid questionnaires. And most of people involved in the research are older than 20 years old and younger than 40,and their degree is above professional training, who have computer use experience to some extent and 60% of whom have used information security technology, meanwhile, around 30% of the researchers express they always use information security technology.

Reliability analysis: Reliability is used to measure the consistency or stability of the measurement items in the same variable, which is an index of reflecting realism of tested measured feature. This article adopts the most popular reliability coefficient-Cronbach's

to test internal consistency and using SPSS to do reliability analysis on researching data to test whether these data are reliable. Table 2 shows the reliability analysis result of each variable.

Table 1. Design of Questionnaire Scale

variables	scale question items
perceived usefulness PU	PU1 I think using information security technology can solve information security problems that I encounter.
	PU2 Using information security technology can increase the security environment of computer or cell phone which is helpful for my job or life.
	PU3 Using information security technology can effectively protect my information.
	PU4 Generally, I think information security technology is very helpful for me.
perceived ease of use PEOU	PEOU1 I think the operation step of information security technology is simple and clear.
	PEOU2 I think learning to use information security technology is very easy.
	PEOU3 For me, it's easy to use information security technology skillfully.
technology utility TU	TU1 Information security technology is a practical and valuable technology.
	TU2 The function of information security technology is comprehensive and can meet my demand in every aspect of information security.
	TU3 Level of security service of information security technology makes me feel satisfied.
social impact SI	SI1 According to my observation, many people around use information security technology.
	SI2 If seeing others all use information security technology, I'll try it.
	SI3 Friends, relatives and colleagues around me all think that I should use information security technology.
	SI4 When choosing information security technology, I will refer to suggestion and evaluation of people around me and other users.
perceived cost PC	PC1 I feel installing, learning and using information security technology will be a cost of time.
	PC2 I feel the price level of information security technology is difficult to accept.
	PC3 I won't use information security technology that is not free.
	PC4 Promotion activities held by information security technology service provider attract me to purchase.
individual innovation INN	INN1 When knowing a certain new production or technology, I'll learn more information the first time.
	INN2 When a certain new production or technology arises I will try it the first time.
	INN3 I like to try new things.
computer self-efficacy CS	CS1 On condition of without help, I'm confident of using software smoothly which I have not used before.
	CS2 When encountering information security problem, I'm confident of using information security technology to solve it.
	CS3 I'm confident of using information technology smoothly only with on-line help as reference.
intent to use BI	BI1 I'm willing to try or continue to use information security technology if I have the opportunity.
	BI2 I'd like to learn how to use information security technology.
	BI3 I'd like to recommend others to use information security technology.

Table 2. Cronbach's α Testing Result of each Variable

researching variable	Items number	Cronbach's α
perceived usefulness	3	0.952
perceived ease of use	3	0.922
technology utility	3	0.917
social impact	4	0.910
perceived cost	4	0.895
individual innovation	3	0.889
computer self-efficacy	3	0.875
intent to use	3	0.939

In the reliability test in SPSS, value of each variable α coefficient is over 0.8, which is to say data getting from this research is reliable.

Validity analysis: Validity analysis is an analysis method used to measure whether questionnaire scale can precisely reflect researching object and demand, and this article tests the construction validity of questionnaire by testing KMO and Barleet spherical coefficient and factor analysis Value of KMO of this article is 0.868, and it reaches a good level; while value of Barleet Spherical testing coefficient is 1925.408, whose prominence is under 0.001 and near 0 when degree of freedom is 406, and reaches outstanding level. Therefore it is acceptable to do factor analysis. This article mainly uses

the maximum variance to do factor analysis and rotated factor loaded matrix is shown in Table 3. Factor load of perceived cost measuring PC4 is under 0.5, so it is removed from data.

Table 3. Factor Load of each Variable

variables	measurement items	factor load
perceived usefulness PU	PU1	0.846
	PU2	0.719
	PU3	0.765
	PU4	0.704
perceived ease of use PEOU	PEOU1	0.740
	PEOU2	0.765
	PEOU3	0.682
technology utility TU	TU1	0.718
	TU2	0.636
	TU3	0.634
social impact SI	SI1	0.778
	SI2	0.870
	SI3	0.802
	SI4	0.715
perceived cost PC	PC1	0.833
	PC2	0.831
	PC3	0.727
	PC4	0.461
individual innovation INN	INN1	0.846
	INN2	0.875
	INN3	0.606
computer self-efficacy CS	CS1	0.766
	CS2	0.862
	CS3	0.853

Correlation analysis: Correlation analysis is a statistical method used to study uncertain relation among variables and it determines correlation among factors influencing user using information security technology by performing correlation analysis on different influential factors. This article adopts correlation analysis method of Person and SPSS to analyze related relations of model variables and the results are as follows:

- Perceived usefulness has obvious positive relation with perceived ease of use in level of 0.01.
- Perceived usefulness, perceived ease of use, perceived cost, individual innovation feature and social impact all have obvious positive relation with intent to use in level of 0.01, while the relation of perceived cost and intent to use in level of 0.01 is obviously negative.
- Technology utility and perceived ease of use all have obvious positive relation with intent to use in level of 0.01.
- Perceived ease of use and individual innovation all have obvious positive relation with computer self-efficacy in level of 0.01

Regression analysis: The correlation analysis has demonstrated the obvious relation within several factors involved in this model. Performing regression analysis on this basis could point out the further direction of relation and illustrate further whether there exists cause and effect relation.

According to the former hypothesis this text does multi- regression analysis and the result suggests that the sequence of influence of user's intent to use in descending order is perceived ease of use, social impact, perceived usefulness, perceived cost, technology

utility, individual innovation, in which direct effect of technology utility to intent to use is not obvious, technology utility indirectly influences intent to use by influencing perceived usefulness that is also evidently influenced by perceived ease of use at the same time. Yet users' computer self-efficacy indirectly influences intent to use by directly impacting perceived ease of use and individual innovation. Except for perceived cost has negative obvious influence on intent to use, influences among other factors are all positive.

Model revise: Data analyzing results basically support the hypothesis put forward in this text, depart from the unclear influence of technology utility to intent to use other hypotheses all get support. Model amended is shown in Figure 2.

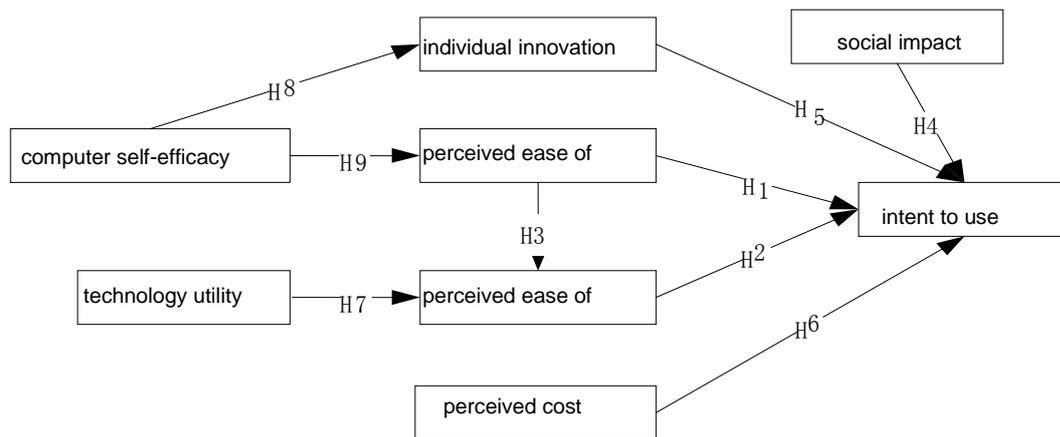


Figure 2. Amended Model of Information Security Technology User Behavior

5. Conclusion

Through aforementioned analysis we can see perceived usefulness, perceived ease of use, individual innovation and social impact effect all have positive and direct impact on users' intent to use; perceived cost owns negative direct influence on intent to use. Among them direct influence of perceived ease of use and social impact is the biggest, after that is the impact of perceived usefulness and perceived cost, additional, technology utility of information security technology that users cognate has obvious positive influence on perceived usefulness; yet, users computer self-efficacy can obviously and positively influence perceived ease of use.

On basis of the studying result of this text, to make information security technology get better development and be accepted and used by more users, the following aspects can be taken into consideration. (1)Simplify using method and cater to users' requirement. According to the study result, perceived ease of use is the biggest factor that influence users' intent to use. Complexity, specialty and difficulty to operate of information security technology is one of the main reasons redefining user's using and research on future information security technology convenient to operate and easy to use is the most central question. (2)Pay attention to social impact and set up good public praise. User's choosing of information security technology will be impacted by social groups around them and in information age more and more frequent and tight communication of users increase this impact. Therefore setting up good public praise and making good use of social impact as well as broadening it is also important way to use information security technology. (3)Reinforce technology innovation and build functional advantage. Whether the function of information security technology is comprehensive or technology level is high or not, they intuitively influence user's choosing, so that reinforcing research and innovation in aspect of technology, forming technical advantage and increasing cognitive practicality and technical effectively of users to help users to applying information security

technology. (4)Decrease using cost and exploit price strategy. Economic motivation and cost factor cannot be ignored no matter in whatever markets, therefore formatting reasonable price strategy and decreasing user's applying cost so as to improve user's information security technology.

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