



THE PERCEIVED KEY FACTORS OF PUBLIC E-SERVICE

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ABSTRACT

This article will assess who are the users of public e-service are and what their traits include, and then will further discuss what the perceived key factors that encourage people to use the public e-service. Lastly, what are the main factors to sustain the user to use the public e-service will be addressed as well. There have been many studies focus on e-commerce; however, very limited discussion tries to explore the e-service provided by the public sectors. Understanding the user traits and perceived key factors of public e-service through academic research plays a crucial role when government agencies confront obstacles of promoting e-government development.

The main study area of this article will separate into two parts – “user traits” and “perceived key factors of public e-service.” Although they do not come out frequently in relation to the Technology Acceptance Model, “user traits” is one of the major factors that affect people’s service usage behavior. This article will take comprehensive perspective, from service marketing theory, Technology Acceptance Model, and public administration perspective to collect related user traits. As a result, this article will choose the following five critical user traits for this study: Technology Readiness; Technology Anxiety; Interpersonal Interaction Need; Tendency of Engaging in Public Affairs; and Risk Perception.

For the perceived key factors of public e-service, the following areas will be discussed:



Internet Speed, Security, User Interface, Reliability, and Consumer Response. Below is the literature review of user traits and perceived key factors of public e-service.

Keywords: E-commerce, Public E-Service, E-Government

INTRODUCTION

One of the most remarkable and dramatic changes of ICT usage in recent decades has been the explosion of interest in the Internet, with the phenomenon of e-commerce becoming, in just a few years, a principal growth area in the worldwide economy. As the use of the Web by the private sector has increased, the public sector has followed closely behind, with all developed countries and almost all developing countries now having their own websites providing services and/or promoting their policies in real-time. More and more government agencies are using websites or portals in the same way as the private sector. The digital or electronic government is a contemporary trend in the globe, and the public servants around the world are also adopting novel ways to leverage information and communication technology (ICT) to better serve their constituents (Marchionini et al., 2003).

As these websites have been seen as the first step toward e-government, they are rapidly becoming a new aspect of government. Many citizens now have a brand new experience of contacting their governments online to communicate their opinions on current issues, request or submit an application, or petition an Act.

On one hand, most e-government initiatives are aimed at improving the efficiency of public administration through ICTs. On the other hand, such initiatives are also looking at ways to govern the public in an interactive way. In other words, engaging citizens in public affairs has been treated as a serious pursuit by government agencies, and the existing relationship between government and citizens is changing from the traditional one. This is also called “e-governance,” as it tries to reinforce the connection between public officials and communities, thereby leading to a stronger and more accountable and inclusive democracy.

Since the rapid development of public e-service, it is now common for service providers such as government agencies to encourage people to use their new public e-service. According to a research done by the Development and Evaluation Commission of Taiwan (2012), the percentage of people searched government policy or announcement through the internet has increased from 35.7% to 52.6% during the year 2010 to 2011. Comparatively, the percentage



of using online application (through public e-service) on governmental websites has only increased from 23.9% to 31.3% during the same year. It is then evident that the percentage of people using public e-service had not been promoted effectively. From the point of view of service providers, in order to enlarge the usage number, it is important to know who the users of public e-service are how to distribute their usage experience to achieve multiplier effects.

1. User Traits

1.1 Technology Readiness and Technology anxiety

The concept of Technology Readiness is brought by Parasuraman. It can be analyzed from people's mentality and their overall status for discovering whether this person have the tendency of using new technology. Generally speaking, people who used to internet environment should have basic knowledge of computer and network. It can be seen as one who has a competency perspective and problem-solving capability. However, technology readiness is more focusing on natural psychology level rather than the acquired ability of people.

According to Parasuraman, there are four dimensions of Technology Readiness which are optimism, innovativeness, discomfort and insecurity (Parasuraman and Colby, 2003). These are used to analyze people's motivation and inhibitions of using technology, but not competency. Optimism is to view technology and belief in a positive way while increases control, flexibility, and efficiency for people's lives. Innovation is a trend for becoming a pioneer of technology and thought. Discomfort means the feeling of being overwhelmed or perceived lack of control over technology. Insecurity is the attitude of distrust and doubtful of their own technology capability. According to above description, optimism and innovation can be seen as the motivation of using technology. On the other hand, discomfort and insecurity are the inhibitors of technology (Parasuraman and Colby, 2001). Hence, people who like to adopt new technology usually have high motivation while having low inhibitors.

The other concept is technology anxiety which is highly related to technology readiness. According to Meuter (1994), the definition of Computer anxiety is "the fear and apprehension felt by an individual when considering the implications of utilizing computer technology or when actually using computer technology." Moreover, the technology anxiety is not only focused on above mentioned Computer anxiety, but also focused on a people's state of mind



when they are using all kind of technology related tools. In compare with Technology anxiety, Technology readiness is specially emphasized on people's willingness and capability of technology usage in opposite position.

In fact, the state of mind plays an important role of whether users would accept new technology or not. People who recognize that the efficiency of new technology, when the discomfort has occurred, they will still avoid using it (Fang and Hsu, 2005). Apart from state of mind, the population statistics variable will affect technology anxiety as well. In the study of Lee et al. (2010), he took retail's self-checkout system as an example and indicated sex, age, and income will affect technology anxiety remarkably.

Technology Acceptance Model (Davis, 1989) explains the attitude of people using technology and their behavior, which is derived from their perceived performance to technology and perceived ease of use. In fact, these two factors can affect people's innovation of using technology or so-called technology readiness. Citrin et al. (2000) pointed out that innovation in specific individual area will have an interference effect to technology tools usage, such as internet or online shopping. Furthermore, Dabholkar and Bagozzi (2002) found that the characteristic of inherent novelty seeking will attenuate people's perceived performance toward using technology tools.

In addition, Dabholkar and Bagozzi (2002) used the terms of "self-efficacy" to explain people's attitude of using technology for self-services. In general, customers with greater self-efficacy will have more confidence in their capability of technology usage. In this case, high self-efficacy is similar to low technology anxiety. Yi and Hwang (2003) pointed out that self-efficacy can be divided into "application-specific self-efficacy" and "computer self-efficacy," which will have a positive effect on ease of use and actual use of the system respectively. Meuter et al. (2003) explained technology anxiety level will affect one's experience of using technology. The lower the technology anxiety is, the higher the satisfaction toward technology-based self-services.

To summarize, technology readiness and technology anxiety are both intrinsic factors which describe the state of mind of users in the process of using technology. In compare with other extrinsic factors such as information access, information ability, and information literacy, these intrinsic factors can explain why citizens have different percentage of internet usage in same country. In other words, given the same level of technology access, users'



intrinsic factors would have greater influence than extrinsic one.

1.2 The Need of Interpersonal Interaction

Service encounter has been seen as a major factor that affects consumers perceived the level of service quality. It has been defined broadly as a period of time during which a consumer directly interacts with a service, which means the interaction between customer and service delivery system including service employees, facilities, and other tangible factors (Bitner, 1990). Hence, a loyal customer derived from direct interaction (such as face to face contact) with service employees has played an important role in terms of service marketing.

Dabholkar (1996) used the term “need for interaction with a service employee” to explain the situation. It was defined as the importance of human interaction to the consumer in service encounters, and this interaction in a service delivery is very important to some consumers (Bateson, 1985). In addition, under the circumstance of using self-service technology such as the ATM machine, some of the customers will avoid using it due to their tendency of needing interaction with service employees. Hence, tendency of interpersonal interaction need will affect customer’s perceived ease of use attitude of using technology-based self-service (Dabholkar and Bagozzi, 2002). Moreover, the need of interpersonal interaction will also related to some population statistic variables, such as sex and age. Generally speaking, female tend to use self-service technology with more interactive information, and at the same time looking for assistance from service employees (Burke, 2002). As mentioned, customers with higher tendency of interpersonal interaction need, he or she will likely to avoid using any self-services machines. It is because they want to interact with employees directly. Hence, for those who with higher tendency interpersonal interaction need, providing a usage introduction of self-service machine by service employees can enhance customers’ perceived of using service.

1.3 Tendency of Engaging in Public Affairs

Depending on the different research fields, tendency of engaging in public affairs (or so-call Civic engagement) has various definitions. It refers to the ways in which citizens participate in the life of a community in order to improve conditions for others or to help shape the community’s future (Adler and Goggin, 2005). In “Bowling Alone,” a famous book written by Putnam, he indicated that civic engagement is a basic foundation for building “Social



Capital". The form of civic engagement includes official and unofficial social activities. The former includes visiting friends, and playing poker with friends, while the latter is to engage in community service and political engagement (Putnam, 2001).

Regarding the interactive effect between technology usage and people's tendency of engaging in public affairs, it turns out to be an ambiguous relationship due to the limitation of methodology and observation of raw data (Norris, 2001). The existing studies provide explanation of the relationship between two perspectives. One is Optimism and the other one is Pessimism or Skepticism. Norris (2001) indicated mobilization and reinforcement hypotheses based on skepticism. Mobilization hypotheses considered that the technology is able to encourage majority of people to involve in public affairs, whereas reinforcement one believed that technology will enlarge the digital divide because only those who have the power to access the information through technology will dominate the resource. As a result, Carpini's research (2000) also indicated that technology can increase the civic engagement for those who are interested in public affairs, or has involved in public affairs, however, to those who are not interested in public affairs, the technology is somehow useless or ineffective. In general, most of the researchers agree that technology causes the reinforcement effect rather than mobilization effect toward the civic engagement. For those who had already highly engaging in real world will enlarge their experience to virtual world with using technology. According to Norris's (2001) reinforcement hypotheses, people who have engaged in public affairs will tend to use public e-service and generate positive result.

1.4 Risk Perception

Risk perception is the subjective judgment that people make about the characteristics and severity of a risk. It referred to the feeling of uncertainty regarding possible negative consequences of using a product or service (Featherman and Pavlou, 2003). A formal definition is a combination of uncertainty plus seriousness of outcome involved and the expectation of losses associated with purchase and acts as an inhibitor to purchase or using behavior (cited from Featherman and Pavlou, 2003). In addition, risk perception can be viewed as a substitution behavior consequence (Featherman and Pavlou, 2003). For example, purchasing luxury can increase financial risk but reduce social risk. Under the background of public e-service or technology based self-service, there are many courses discussing about psycho-social and performance risk, as well as new subjects such as privacy risk (Featherman and Pavlou, 2003).

In addition, Dabholkar and Bagozzi (2002) referred social risk to explain the concept of “self-consciousness” in terms of using technology service. Self-consciousness will affect the outcome of perceived feeling. Their study pointed out an interesting result that if a person has higher self-consciousness, which is also higher social perceived risk, he or she will hesitate to use technology based self-service. In other word, high social perceived risk could be the reason that people are unwilling to use technology. The same result was also pointed out by Bateson’s research (1985).

2. Perceived Key Factors of Public E-Service

2.1 Internet Speed, Security, and User Interface

Internet speed has been the major factor of whether the public e-service can be accepted by customers as a convenient tool. Since the rapid development of information and communication technology, Internet speed level is gradually increasing. However, whether faster Internet speed enhancing customers’ willingness of public e-service usage remains as an unsolved issue. In fact, increasing Internet speed level does not mean that customers are willing to use the public e-service, the satisfaction toward Internet speed most depends on personal subjective feeling. Nevertheless, the interactive relationship between Internet speed and customers is an important issue for many scholars because few studies discussed the connection between Internet speed and customers’ satisfaction (Fillion and Ekionea, 2010). In addition, it is important to construct a reliable research methodology for connecting Internet speed and customers’ satisfaction effectively. According to the study of Fillion and Ekionea (2010), Internet speed plays a critical role in customer’s satisfaction level. Moreover, Alpert (2008) had pointed out that Internet speed is the major factor that customers are willing to choose technology based self-service.

Security is a major factor that has great influence on customers’ public e-service usage as well. Alpert (2008) indicated that the biggest reason of customers using self-service system is because they can have multiple ways to finish the transaction with high protection of privacy and easy to use. Among the reasons, privacy protection can be taken as one dimension of security. In general, although the level of security depends on which technology in used and the understanding toward technology, nevertheless; most of customers do not really want to spend too much time nor having required knowledge, such as fire wall or password verification setting (Rosada el at 2006). Hence, the only thing that customers concern in

terms of security issue is whether the public e-service provided full protection. In terms of the level or the type of protection is not in customers' consideration. Furthermore, customers' will ask public e-service providers take full responsibility of customers' security issue. If the public e-service providers failed customers' expectation, it will affect their satisfaction and willingness toward the service usage considerable.

Since the user interface is the first thing that customers encounter when using public e-service, it is another important perceived key factors of public e-service and also representing an critical intermediary role between customers and the service. Fjeld and Barendregt (2009) indicated that a good user interface should include high efficiency, high effectiveness, and high satisfaction. Zuehlke and Thiels (2008) have similar conclusion. In brief, a good user interface can encourage customers to use public e-service, and can bring higher effectiveness and feedback for the service. Furthermore, it will help to increase customer's willingness of public e-service usage as well.

2.2 Reliability and Respond

If public e-service's reliability cannot be validated by customers, they will reduce their willingness to use the service, and the service will be less likely to have high satisfaction indeed. No matter which service is purchased by customers, the reliability of service is always on the top of customers' list (Hensley and Utley 2011). In addition, Hensley and Utley (2011) pointed out with a technology tool that can increase service's reliability, and it can also enhance customers' understanding and usage tendency toward the service. Furthermore, it will strengthen the trustful relationship between customers and the service.

Consumer Response is another concept for discussing this issue.— The definition of consumer response is after customers using the service, they will give response accordingly. In addition, Pauwels (2004) pointed out the level of consumer response depends on products and the content of the service, and the major decisive factor that makes the difference is derived from the service providers. Hence, consumer response is an interactive relationship between service providers and services users, which whenever one's action will cause its counterpart to respond accordingly, and vice versa. Svensson (2002) mentioned the origin of the consumer response is designed as a research pattern which explains interaction between service providers and customers. Furthermore, a good consumer response can be viewed as customers accept the service and are willing to keep using the service.

Although there are many articles discussed about user traits and perceived key factors of public e-service, we still do not know whether these factors have anything to do with the public e-service usage. It would be useful for government’s public e-service promotion if we can find out which perceived key factors plays more important role in the issue of public e-service usage. Furthermore, the research result will also help to increase the customers’ willingness to use the public e-service, and to increase the satisfaction toward the service.

METHODOLOGY AND ANALYSIS

Based on literature review above, this study’s research frame is as follow:

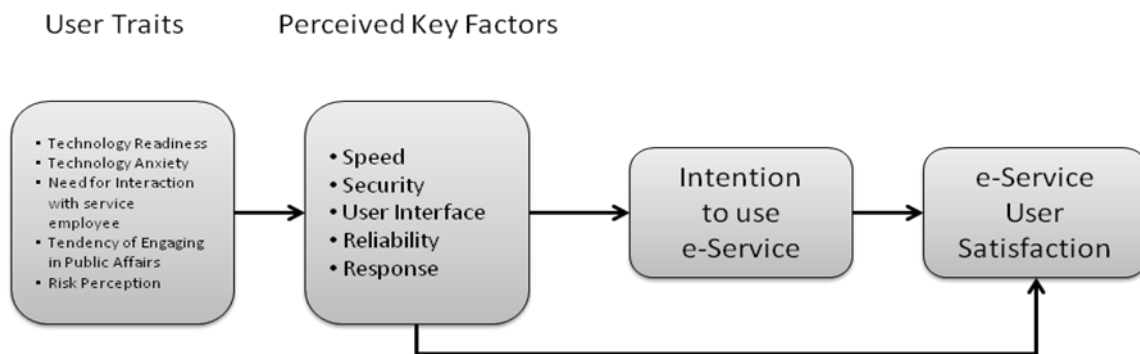


Figure 1 Research structure of the study

Many previous studies that have adopted a user-centric approach to e-government are concerned with how to provide a more convenient and continuous service to users from a system perspective. However, there is no research that explores the intrinsic characteristics and their effects on public e-services. This study tries to look into this important individual variance in terms of user traits in order to gain insight into the current user’s profile, by discussing user traits and the perceived key factors of the e-service, and by examining the causality. Meanwhile, unlike previous studies that discuss from a single perspective, such as information system or service marketing, this study employs a multi-faceted analytical method by integrating different kinds of theories and perspectives. From a multi-faceted literature review, the major intrinsic determinants, such as computer self-efficacy, technology readiness, anxiety, risk perception, human contact and engagement experience, which might be influential toward the user’s perceived key factors of a public e-service.

The relationship between user traits and perceived key factors has been discussed in the literature review section above. People with various characters will have different perceived

key factors toward public e-service and will have influence on the “intention to use” and user’s “satisfaction”. Taking technology anxiety as an example, personal character of technology anxiety will have great impact on the perceived key factors of public e-service, including Internet speed, security, user interface, reliability, and consumer response. In terms of the relationship between perceived key factors and “intention to use”, it can be explained by the relationship between behavior and intention from the Technology Acceptance Model (TAM). Within TAM, the perceived usefulness and perceived ease of use has great impact on usage behavior. In this article, perceived key factors of internet speed, security, user interface, reliability, and consumer response has same effect on “intention to use” like perceived usefulness and perceived ease of use from TAM.

To verify the factors in this study, a survey was conducted by a statistic methodology called Partial Least Squares (PLS), in order to analyze the data. The survey had been conducted for two weeks and the targeted respondents focused on the user who had used public e-service online. –We had collected 228 questionnaires while four of them were invalid so the total number of valid questionnaires is 224. The original questionnaire comes from past related article and its content is validity. Before acquiring raw data and conducting the PLS analysis, it should conduct factors analysis first for selecting the question properly. Because the original questionnaire contains over 60 questions, so it needs to take off some of the irrelevant questions for the research. –In addition, to avoid second-order problem, it have to have factor’s score to represent the original factors or potential variable.– The original questionnaire include 62 questions, verify in 4 dimensions, and 15 factors. After the factor analysis, 25 questions was abandoned due to their scores was lower 0.7. –The remaining 37 questions are highly relevant to verify the dimensions, including Discomfort, Insecurity, and Innovation from technology readiness, technology anxiety, interpersonal interaction need, risk perception, and tendency of engaging in public affairs; security and consumer response of perceived key factors; public e-service intention to use and user’s satisfaction.

In terms of the reliability and validity of this study, almost all dimensions’ composite reliability is higher than standard 0.7 except technology readiness (0.679748) and perceived key factors of public e-service (0.665302). Regarding the validity, most of potential average variance extracted (AVE) is higher than 0.5, only technology readiness (0.424) is lower than the standard 0.5. The standard level of the whole model can be observed from communality. In general, all of the communality of the dimensions is higher than 0.3, which means the model constructed by this study is fit with the standard level.



After conducting the path analysis on all dimensions for understanding the relationship between each dimension, the result is showed in figure 2. According to the result we have, the user traits to the perceived key factors of public e-service, including interpersonal interaction need, technology anxiety, and risk perception, reaches significant level, and their path coefficients are 0.4987, 0.2838, and 0.2994. As the result, we can conclude that the user with higher interpersonal interaction need, technology anxiety, and risk perception will have higher perceived and need on security and consumer response of perceived key factors.

In addition, users' perceived key factors of public e-service is significant at "intention to use" (0.1396, $p < 0.05$). Meanwhile, users' perceived key factors of public e-service is significant at user satisfaction of public e-service (0.642, $p < 0.01$). In other word, selected two perceived key factors from this study, the security and consumer response, has impact on "intention to use" and "satisfaction" respectively. The two perceived key factors, security and consumer response, are highly influencing the satisfaction of usage in terms of e-service. It means the perceived key factors in this study are critical toward user's satisfaction. However, the relationship between perceived key factors and "intention to use" is relatively weak. "Intention to use" needs other antecedents to give more explanation power in this model. Taylor and Todd (1995) considered that other mediators like attitude, subjective norms and perceived behavior control should existed between perceived key factors and behavior intention, and the model is named "Combined TAM and TPB Model". Though this study did not mention these antecedents, it still offers a meaningful direction for the further research.

Finally, we can know from the path analysis that interpersonal interaction need and technology anxiety has significant indirect effect on "intention to use" and "satisfaction". In other word, interpersonal interaction need and technology anxiety in the model are two critical user traits. These two user traits will have considerable influence on the "intention to use" and "satisfaction" of public e-service.

Table1. Reliability and validity of this research

Dimensions	Composite Reliability	AVE	Communality
	>0.7	>0.5	>0.3
Technology Readiness	0.679748	0.424	0.424375
Technology Anxiety	0.933982	0.78	0.779854
Interpersonal Interaction Need	0.84625	0.651	0.650665
Risk Perception	0.927943	0.811	0.811482
Tendency of Engaging in Public Affairs	0.916177	0.785	0.785199
Perceived Key Factors	0.665302	0.5	0.5
Intention to Use	0.8783	0.644	0.643966
Satisfaction	0.92883	0.813	0.813182

Figure2 Result of Path Analysis

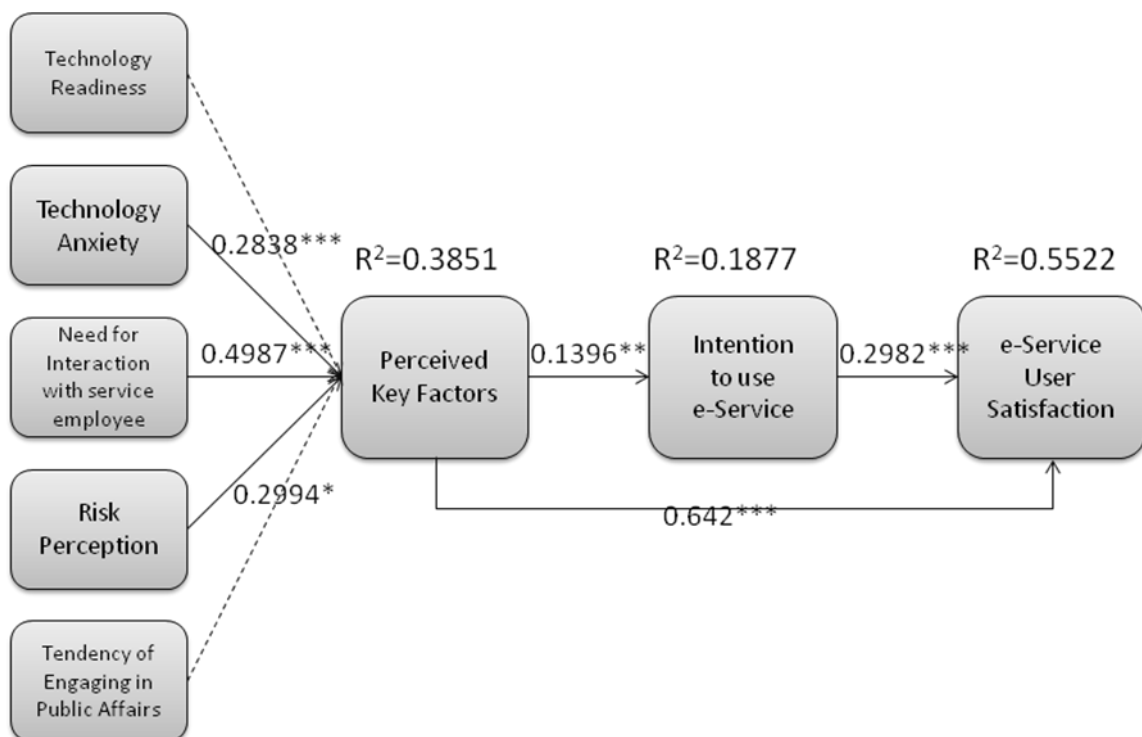


Table 2 Path analysis and statistics

Constructs	Perceive key factors of public e-service	Intention to use of public e-service		User's satisfaction of public e-service	
	Direct	Total	Direct	Total	Direct
Interpersonal interaction need	0.498741*** (8.922018)	0.069630* (1.555993)		0.498741*** (6.802200)	
Tendency of engaging in public affairs					
Technology readiness					
Technology anxiety	0.283787*** (3.182351)	0.039620* (1.591403)		0.194001*** (3.145525)	
Risk perception	0.299427* (1.357773)				
Intention to use of public e-service				0.298221*** (6.325107)	0.298221*** (6.325107)
Perceived key factors of public e-service			0.139611** (1.674042)	0.683614*** (15.915843)	0.641980*** (16.547857)

Notes: Values in parentheses are t values, *P<0.1, **P<0.05, ***P<0.01



CONCLUSION

From analysis result of the survey, we can find out the relationship between user traits and perceived key factors of public e-service are relevant, of which especially the technology anxiety, interpersonal interaction need, and risk perception are significant relevant. From the articles discussed technology anxiety, need for interaction with service employee, and risk perception, people may have intrinsic concern because for one thing customers don't understand the technology, another is because they used to interact with service employee directly, still another is because they feel about risk will come along with public e-service usage. All of these will result in low public e-service usage and affect their intention to use and user satisfaction. In addition, user traits are intrinsic factors of customers, and the starting point of deciding whether customers are willing to use public e-service. The starting point will affect extrinsic factors such as perceived key factors of public e-service, and will affect the usage willingness and the level of usage.

For those governments who provide public e-service, it is an important to consider user traits and perceived key factors while constructing public e-service and promoting the usage willingness. The government's public e-service usually doesn't have the image of good quality service. Hence, public e-service cannot have positive impact on government's public image and may produce obstacles on its policy promotion. From the point of view of policy marketing, because most of the services are taken as public good, hence it will not target customers like business marketing does (Snively, 1991). Nevertheless, the government and other related departments still need to find out who are the users. Snively (1991) indicated that the core of the policy marketing pattern is targeted customers which they are existed indeed. Through the analysis of this study, we can know who the users of public e-service are and what perceived key factors that they care the most, and use these research results to improve public e-service quality.

Public e-service is one of the most convenient tools of information communication. However, if the advantage of public e-service cannot be developed completely, there will be no actual outcome even with mass resource investment. If governments take user traits, including technology anxiety, interpersonal interaction need, and risk perception, and perceived key factors into consideration while providing public e-service, it will promote intention to use and user satisfaction effectively.

Understanding user traits will help us to know who are the targeted users firstly and start to plan marketing strategy of public e-service. According to Roger's (1995) diffusion of innovations theory, new technology will only be adopted by Innovators in the beginning, then spread their usage experience to other early adopters, early majority, later majority, and laggards. Hence, the promotion of public e-service needs to know who is its targeted users and defines them as innovators and through the distributing of innovators' usage experience to the public. We will have higher public e-service usage percentage effectively and efficiently.

RESEARCH RESTRICTION AND FUTURE RESEARCH DIRECTION

First, the respondents of the survey have the experience of public e-service usage in Taiwan and it was not restricted in any specific e-service area. However, due to the wide range of public e-service, it includes personal online application, information search, and governmental public procurement bid are all public e-service. In general, different services will have various perceived key factors and user traits. –It is a future task to conduct further study on specific public e-service for understanding the relationship of their user traits and perceived key factor.

Second, although this study is conducted through PLS analysis and it is possible to do further analysis of factors' relationship, the relationship among samples cannot provide any further analysis result. Because user traits are the key of this study as well, if adopted other statistics analysis, we can categorize those user traits and perceived key factors of public e-service. It will help the actual policy plan significantly. Moreover it is possible to use other research analysis with the existing raw data to have a more adequate analysis.

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