

Factors predicting continued usage of e-government websites: A Combined

Qualitative and Quantitative approach

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Abstract This study adopts an exploratory sequential design with a mixed-method approach to identify factors predicting users' willingness to continue use of e-government websites. Firstly, it analyzes the interview data based on grounded theory, and constructs the theoretical framework of public's willingness to continue use of government e-portals. Second, it applies a quantitative analysis on the data gathered through a survey design about participants' willingness to continuously use government e-portal. The result shows that the user's perception, user's experience, the external environment of the e-portal, the accessibility of the e-portal and the government attitude influence users' continuance. Among all the factors, user's perception is the strongest predictor.

Introduction

E-government is defined as "utilizing the Internet and the World-Wide-Web for delivering government information and services to citizens" (UN & ASPA, 2002, p. 1). E-government also means promoting citizen participation through information and communication technologies (ICTs) and creating a government that is highly engaged, inclusive and cooperative. Governments' online portals are a crucial component of e-government in modern information society. The efficiency of government's websites has a close relationship with public affairs (Hong, 2013). China, as one of the most rapidly developing countries with the largest population in the world, has embraced the information and communication technology at all different levels of governments. However, based on the first census (China Census, 2015) of the

governmental websites in China, some issues have been identified, such as low accessibility of some governmental websites, lack of updates on the information on the websites, low accuracy and late responses, etc., which caused the low utilization rate amongst the users.

Hence, how to increase the public use of government websites has become the key part to improve e-governance in China. In the previous literature, scholars mainly focused on the initial adoption of government websites. There were few studies on the public's willingness to continue usage, once it is initiated. Thus, this paper aims at examining the public willingness to continue use of government websites, and the factors that influence it. In addition, the study also puts forward a new model for consistent usage of government e-portals which could fit in the needs and demands for local community. Practically, the model could help improve the utilization rate of government websites among Chinese users.

Literature Review

In recent years, research on e-government websites from the lens of behavioral science has significantly increased (Riffe et al., 2019). Previous research mainly treat government website as an information system, and scholars adapt related behavioral theories. Specifically, the literature can be categorized into studies of the initial adoption decision and analyses of the decision to continue usage, once initiated. For the initial adoption decision, researchers have examined user behaviors using the theory of reasoned action (Alryalat, Rana, & Dwivedi, 2015), theory of planned

behavior (Ozkan & Kanat, 2011), technology acceptance model (Lin, Fofanah, & Liang, 2011) through case studies. However, initial adoption is just the first step for users in the adoption behaviors; research also needs to address the decision to continue usage once initiated. In order to investigate the factors which influence continuance of usage, academics have used the Expectation Confirmation Model (Bhattacharjee, 2001). It built on the theory of information system continuance which has been widely accepted (Brown, Venkatesh, Kuruzovich, & Massey, 2008; Thong, Hong, & Tam, 2006; M.-C. Lee, 2010; Y. Lee & Kwon, 2011; Ouyang et al., 2017).

Through the collation of the existing literature, two perspectives on continued use may be identified: (1) using theories or models related to the initial adoption to discuss those factors affecting the intention of continuance (Zhou, Ma & Xu, 2012; Wang, Xu, & Chan, 2015); and (2), research based on information system continuance model (Jiang, Ji, 2014; Tang, Han, & Wu, 2016). In general, most studies on Chinese government websites fall in the first category and use theoretical models such as TAM (Zhao & Liu, 2018), Expectation Confirmation Model (Zhang, Guan, & Meng, 2011), Information Systems Continuance Model (Jiang, 2011) and so on. Few studies have tried to establish the continuance intention. Second, a majority of these theoretical models originated from the researches on adoption behaviors in e-commerce (Liu & Wei, 2003; Pavlou & Fygenson, 2006; Hwang, 2010), whereas there might be disparities between a commerce website and a public service website. The disparities might not only impact the generalizability of related research, but also restrict the development of fundamental theories. Third, in the previous literature,

scholars often use single method, mainly focusing on quantitative approach. Although the quantitative approach has successfully identified various factors influencing the consistent usage among users, non-quantitative approach might help to find out more nuances among the users as well.

Thus, this paper aims at resolving these gaps in the existing literature to find out what factors affect the public willingness of continuance of usage on government websites in the Chinese context.

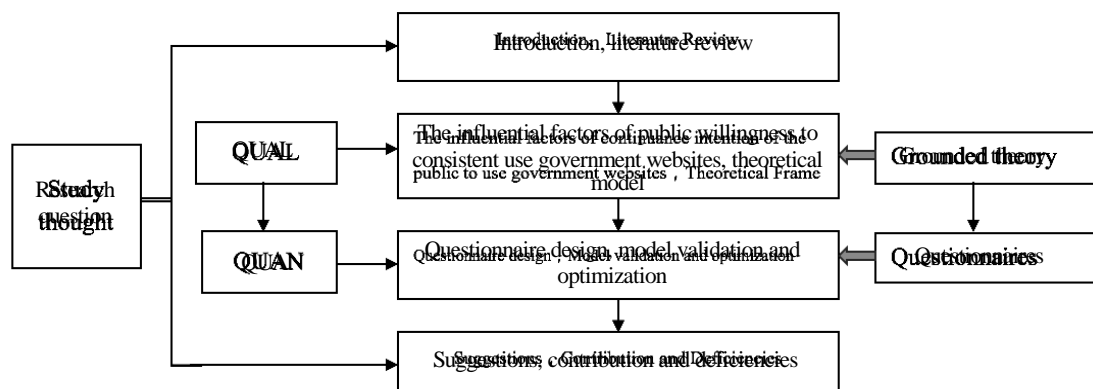
Methods

Since governments at a variety of levels and with various functions have deployed e-portals, it is crucial to choose the appropriate websites to examine. Among all administrative units in China, websites of prefectural-level cities might contain greater research significance for three reasons: first, prefectural-level cities interface not only with the central, municipal and provincial level governments, but also connect with the county and township levels. Second, the prefectural-level city government websites provide more detailed information and better service for people meeting their local needs and demands. Third, all prefectural level city governments in China have their own portals (Loo & Wang, 2017). Therefore, this paper picks the government websites of prefectural-level cities as the population. Hence, in the following paragraphs, government websites imply the government websites of prefectural-level cities.

Scholars have pointed out previously that existing research methods and perspectives, designed mostly to study adoption behaviors, are unable to satisfactorily

explain continuance of usage on government websites (Hong, Tai, Hwang, Kuo, & Chen, 2017). Thus, it is time for researchers to re-construct theories and models in order to meet the need for recent development of ICTs. Accordingly, this paper firstly applied the exploratory sequential design of mixed methods. This design is suitable in the scenario that when theoretically when there are more variables or concepts frames beyond the current existing literature. Combining qualitative and quantitative researches, this paper aims to discover and examine the key factors that impact the public willingness to continue usage of government websites. In addition, this paper also integrates the results from both qualitative and quantitative approaches in order to enhance the reliability of the study. Furthermore, it also reexamines the data with the results within the proposed model, so as to interpret the mechanism amongst variables in a better way. Figure 1 has shown the structure of the whole study as follow:

Figure 1 Structure of current study

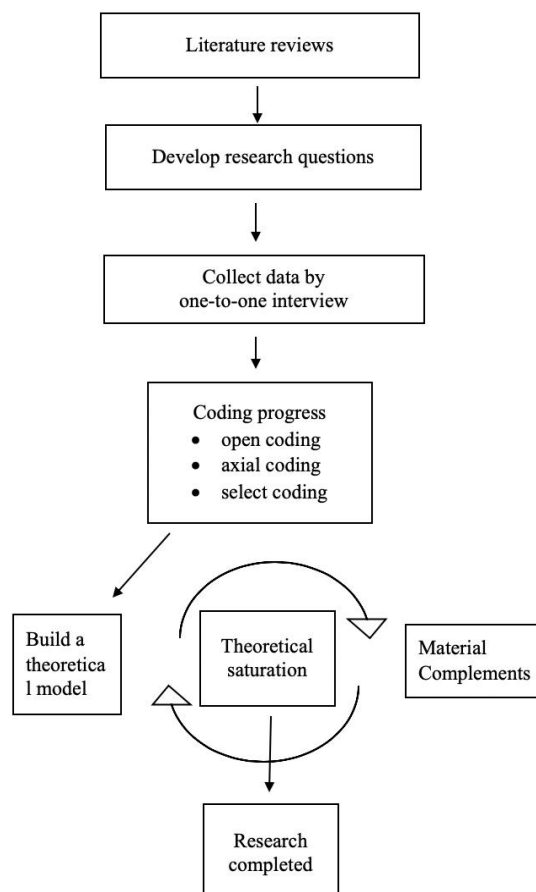


Qualitative Research Design

Grounded theory and interview data. Grounded theory was proposed by Barney G. Glaser (1967) and Anselm L. Strauss (1967). Grounded theory (GT) is a

systematic methodology in the social sciences involving the construction of theories through methodical gathering and analysis of data (Glaser & Strauss, 1967). This research methodology uses inductive reasoning, in contrast to the hypothetic-deductive model of the scientific method. It requires researchers to be open-minded during the process of scientific study, so that they could locate some new theoretical factors which may not be found in the existed researches. The paper adapts the Grounded theory as the fundamental guidelines with a qualitative approach to explore the factors influencing the public willingness of consistent uses of government e-portal. The research steps are shown in Figure 2.

Figure 2. Research steps of current study



Collect interview data. The interview protocol is based on the research subject and finalized by consulting professionals and open discussion. The key points include the perception toward government websites, the reasons and feelings about using government websites, the shortcomings of the service provided by government websites and their causes, and the solution improving the consistent usage of government websites. All interviewees have used government websites before. Through one-to-one interview, I finished data collection until the model were saturated. In total, 49 interviewees participated in the study.

Coding process. According to the coding process of Grounded theory, the study was conducted with open coding, Axial coding and selecting coding in that order, with the results as shown in Appendix 1. And all the coding was conducted by one experienced coder.

(1) Open coding. Coder conceptualized interview data sentence by sentence, and then categorized all the data. Eventually, 87 concepts were detected and 27 categories were formed.

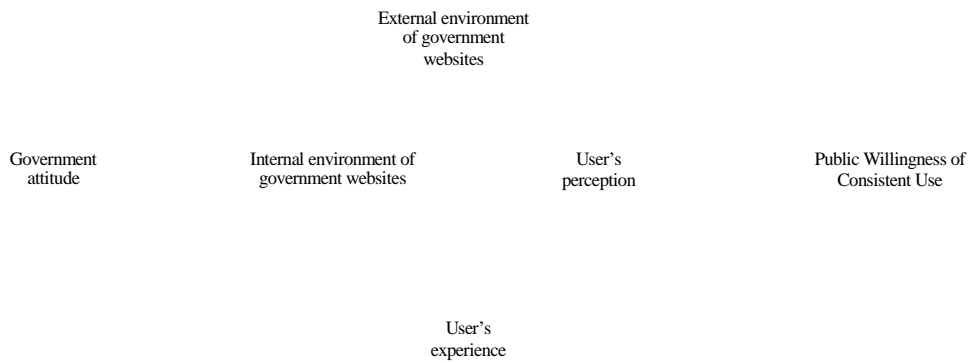
(2) Axial coding. Within the 27 categories identified from the previous step, the coder compared with each other, and analyzed their relations. It resulted in 12 main categories linking the related categories.

(3) Selective coding. In the final step, the coder clarified the relationships among the 12 main categories, and classified them into 5 core categories.

The construction of theoretical framework. Through the coding of interview

data, the coder finalized five core categories: user's perception, user's experience, government attitude toward e-portals, internal and external environment of the government website. Among them, user's perception is the feeling that users receive from the process and results after using government websites, which impacts the willingness to continue usage. The user's experience reflects the computer skills of the users, the behavioral pattern and the demands of their own, which could impact the operation of service, user's perception, and the willingness of consistent usage of government services. Government attitude means the attitude of the government itself toward the service of government websites, which impacts the service operation of governments. The internal environment of government websites means the interface design, development, maintenance and optimization of government websites, which also impacts psychological perceptions. The external environment of government websites refers to the external context in which the public and the government are situated, which would impact the internal environment, government attitude, user's perception and experience. Therefore, the theoretical frame of public willingness toward consistent usage of government e-portal is constructed as Figure 3 shows.

Figure 3. Theoretical framework



The testing of theory saturation. After constructing the preliminary theory frame, its saturation needs to be tested that no other categories would impact the integrity of the proposed model. Following precedents in the literature, this study tests the model with the following questions: how should we transform the data into categories? How does the process of transformation explain a certain category? Are we able to explain it in other ways? If other explanations exist, would it create a new dynamic amongst concepts? Through the repeated tests within the proposed model, no new concept could be found. Thus, we conclude that the construction of theoretical frame based on Grounded theory has reached the status of saturation.

Quantitative Research Design

Research model and hypotheses. According to the qualitative analysis in the last section, the paper adapts the five core categories as the five factors that affect the public's willingness to continue use of e-government website. A good external environment of the government website would have a positive impact on the user's perception, user's experience, government attitude and internal environment of the government websites (Hung, Chang, & Kuo, 2013). Based on this, this paper proposes four hypotheses:

H1: the external environment of the government website positively affects the user's experience;

H2: the external environment of the government portal positively affects user's perception.

H3: the external environment of the government website positively affects the government attitude toward e-portal; and

H4: the external environment of the government website positively affects the internal environment of the government portal.

From another perspective, government portals need to be operated in a way that contributes to the user's experience, which would also positively affect the public's perception and their willingness to continue usage of government websites (Alawneh, Al-Refai, & Batiha, 2013). Hence, I propose that:

H5: user's experience positively affects the internal environment of the government portal;

H6: user's experience positively affects their perception; and

H7: user's experience positively affects their willingness of consistent use toward government e-portal.

Furthermore, a positive government attitude toward its e-portal is conducive to a better operation of the government website. Thus, I put forward the eighth hypothesis:

H8: the government attitude positively affects the internal environment of the government portal.

In this sense, the better the quality of service system provided by the government portal, the better the public perception would be. Therefore, here is the ninth hypothesis:

H9: the internal environment of the government portal positively affects the user's perception.

Last but not least, the better the user perceived the e-portal, the stronger the willingness to continue usage would be (Alshehri, Drew, Alhussain, & Alghamdi, 2012; Lean, Zailani, Ramayah, & Fernando, 2009). Thus,

H10: the user's perception positively affects the public willingness of consistent use toward government portals.

Questionnaire design. The questionnaire of this study is divided into two parts: basic personal information and the measurement of key variables. Personal basic information includes gender, age, education, occupation, and so on. The variables of government e-portal, including user's perception, user's experience, government attitude, internal and external environment of government portal, and the willingness of consistent use on the government portal, are measured by five-point Likert scale ("1" represents "Strongly disagree", and "5" represents "Strongly agree"). According to Bhattacharjee's (2001) research and previous literature on the consistent use of the government portal, the questionnaire ended up with a set of 46 questions totally.

Data collection. A pilot study with a sample of 46 people was conducted before the survey was official launched. Then I sent the online questionnaire curated on WJX.cn (a Chinese online survey platform) through QQ, WeChat, e-mail, and other channels. Based on Gorsuch's finding (1983), we decided to collect 350-400 responses.

From April 26 to May 25, 2016, 400 questionnaires were collected and 354 valid questionnaires were obtained after the invalid questionnaires were removed due to various reasons. The valid response rate was 88.5%. Sample data were mainly from Sichuan, Guangdong, Shaanxi, Beijing, Shanghai, Chongqing, Zhejiang, Fujian and other provinces. Among all respondents, there were 52.5% men, while 90.4% of the respondents were between 18 to 39 years old, and 97.9% has obtained a college degree and above. Additionally, the respondents were mainly students (49.7%), employees (20.3%), and civil servants or public service staff (16.9%).

Data Analysis and Results

Reliability Test

The Cronbach's alpha of willingness of consistent use, user's perception, user's experience, government attitude, internal and external environment of government e-portal were 0.928, 0.874, 0.804, 0.830, 0.886 and 0.734 respectively, which indicated that the measurements have good reliability as the Cronbach's alphas were all above 0.70.

Additionally, the Kaiser-Meyer-Olkin test was conducted, whose value was 0.920 and the significance was 0.000, which indicated that the sampling was adequate as well.

Model Fitting and Hypothesis Testing

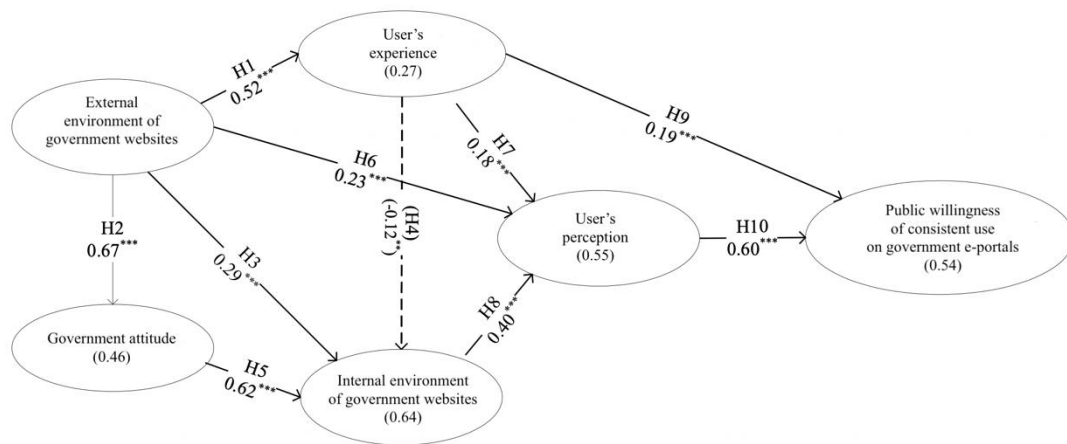
This study used IBM SPSS AMOS 21.0 for confirmatory factor analysis. As the Table 3 shows, the fit index of the whole model reached the acceptable standard, which pointed out that the degree of model fitting is good.

Table 2. Model fit summary of the research model

Fit index	CMIN/DF	RMR	GFI	AGFI	NFI	RFI	CFI	RMSEA
Recommended value	<3	<0.05	>0.90	>0.90	>0.90	>0.90	>0.90	<0.05
Research model	0.523	0.010	0.999	0.990	0.999	0.994	1.000	0.000

From the result of the structural equation model as shown in Figure 4, it showed the hypotheses are validated except H4, which would be discussed in the conclusion part.

Figure 4. Hypothesis testing results based on structural equation model



Discussion and Conclusion

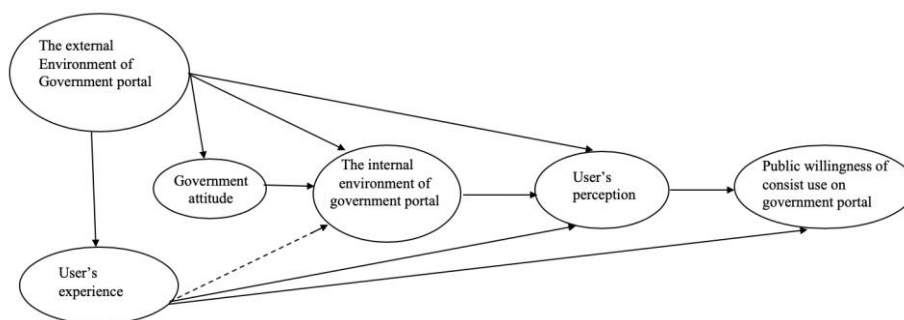
The endogenous variables of the whole model are interpreted with an acceptable degree, which respectively are: user's experience ($R^2 = 0.27$), user's perception ($R^2 = 0.55$), government attitude ($R^2 = 0.46$), internal environment of government e-portal ($R^2 = 0.64$), public willingness of consistent use ($R^2 = 0.54$). It should be noted that the public willingness of consistent use on government e-portals is explained by the variation of 0.54. The high degree of explanation to some extent indicates that the application of this model to explore the public willingness of consistent use on government e-portals is effective.

Additionally, from the path analysis we can tell that: (1) the path coefficients of the external environment of the government e-portals toward the user's experience and the government attitude are 0.52 and 0.67, suggesting that positive direct effect is relatively strong. (2) The absolute value of the path coefficients of the government attitude, the external environment and the user's experience toward the internal environment of the government portal are 0.62, 0.29 and 0.12 respectively, which

show that the influence of the government attitude is more significant comparing to the other two variables. Similarly, the impact of internal environment of government e-portals on user's perception is stronger than external environment and user's experience (0.40). (3) Through calculation based on Structural Equation Modeling, the effect values of user's perception, the user' experience, the government attitude, , the internal environment and the external environment of government e-portal are 0.60, 0.27, 0.15, 0.24 and 0.46. Therefore, the user's perception has the strongest directed effect on the public wiliness of consistent use on government e-portals.

In sum, this paper presents a theoretical model of the public willingness of consistent use on government e-portals based on the Structural Equation Modeling (as Figure 5 shows), where the solid line indicates a positive correlation and the dashed line indicates a negative correlation.

Figure 5. Theoretical model of the public the public willingness of consistent use on government e-portals



As for the reasons that H4 is not supported, this study would offer an alternative explanation that, the higher the user's needs are and the more diverse the individual's

capability and habit are, the more difficult it is for government portals to be taken into account of different user's experience. In turn, it might cause the user's experience negatively affects the internal environment of government e-portal.

By summarizing the data and results of qualitative research, combining with the conclusion of quantitative analysis, this paper puts forward the following suggestions on the construction of government portal to improve public willingness on continuous use:

(1) Create good government portal external environment: develop of relevant laws and regulations; optimize the network infrastructure and create a good e-government culture; learn from the advantages of other alternative ways to improve the competitiveness of government portals.

(2) Establish the correct attitude of government: strengthen the concept of service-oriented government to improve the importance of government sites; confirm online service and on-site service services with the same effect, and improve the information thinking of the staff.

(3) Define the characteristics of government portal users: improve the government portals' data mining and analysis capabilities to accurately understand the user needs; let some services to cultivate the public's habits, such as test registration which must be handled on the government portal.

(4) Ensure the effective service operation of government portals: establish the corresponding functional department, conduct business training for staff, guarantee the investment of human resources and financial resources; Achieve high-quality

government website innovation diffusion through online social media; integrate information resources and service processes to enhance the synergy of the service agencies; regard user needs as the guide, streamline the online service process, shorten the service period; improve the information disclosure system, emphasize the importance of timeliness and usefulness of information dissemination; improve the compatibility, stability and security of government portals; pay attention to public participation, timely and efficiently to respond to public needs.

This paper chooses public willingness of continuous use on prefecture-level government e-portals in China as the research object, adopts the mixed method research, selects the Grounded Theory in qualitative research, and chooses questionnaires method in quantitative research. This kind of mixed-method research avoids the limitation of qualitative research, also makes up the fragmented field of quantitative research, and constructs the theoretical model of public willingness of continuous use on prefecture-level government e-portals in China.

The contributions of this paper are as follows: (1) To supplement and deepen the research of public willingness on consistent use government e-portal, and propose a theoretical model underlying China's e-government situation.(2) To further enrich the theoretical system of studies of the public behavior intention of the government portal, and to provide theoretical support for the development of the government portal which conforms to the national conditions of our country. However, there are some deficiencies in this paper need to be further studied: first, sample coverage and number of questionnaires have yet to be improved; second, in the actual analysis of

the grounded theory, I inevitably brought empirical factors.

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Appendix 1. Results of coding analysis

Core category	Main category	Category	Concepts
Government attitude	Government attitude	Government information thinking	Dependence of traditional seal Identity of electronic seal Preference of public services offline
		Concepts of service-oriented government	Attitude of service-oriented government
		Government paying attention or not	Departments pay how much attention to Leaders pay how much attention to
Internal environment of government websites	websites operation	Organization guarantee	Turnover rate Established related functional departments Manning Providing post staffing Working skills Investments Coordination mechanism Working mechanism Evaluation mechanism Incentive mechanism
		Governmental innovation diffusion	Media promotion Promotion efforts Offline Promotion Websites popularity The recognition of website functions
		Department cooperation	Departments data sharing Office Automation Coordination of departmental resources
	Service quality	Status of websites service construction	Center on public service Insurance of users' benefits If the services match the demands Quality service Comprehensive service Whether the service is close to the public life and interests

Core category	Main category	Category	Concepts
		Responses	Quality of responses Attitude of responses Feelings for obtaining service Service efficiency
		System quality	Characteristics of websites
	Page design		Page content Page attractiveness Page frame Whether the page is boring Simple and lively design Flat design
	Information quality	Information status of websites	Information effectiveness Whether the content is interesting Whether the information is comprehensive Weight of public affairs Whether the information is available
User's perception	User's perception	Degree of satisfaction	Satisfying expectation Feel surprised Satisfaction Satisfaction of competitive products
		Convenience perception	Service processes Feel convenient Feel the website is easy to use
		Cost perception	Deadline Amount of printing Saving costs
		Alternative perception	Regard some functions uniquely Feel the function is irreplaceable
		Usefulness perception	Feelings after use Feel useful

Core category	Main category	Category	Concepts
		Trust perception	Trust techniques Trust websites contents Trust websites Trust governments
		Security perception	Sense of security Privacy concerns
User's experience	User's experience	Habits	Information inquiry Frequency of scanning government websites Fond of surfing Internet
		Demands	More frequently used functions/ infrequently used functions Unaware demands
		Individual ability	Computer knowledge Get used to websites Experience of using computer
External environment of government websites	Alternative resources	Alternative ways	Go offline or get through the traditional media
	Interpersonal influence	Interpersonal influence	Influenced by friends or families
	Infrastructure	Infrastructure	Devices Broadband penetration
	Legal environment	Status of laws	Existed technical safety regulations Laws
	Economic environment	Economic environment	Economic development