

¹ Xianghui Lai
² Yan Wang
³ Mengting Ye
⁴ Guoxin Zhuang
⁵ Ze Li
⁶ Guosong Lin
^{1*} Xiaoping Lin*

Analyzing the factors influencing satisfaction and continuous use intention of Chinese government WeChat official accounts: Applying SEM approach



Abstract: - Government WeChat official accounts (GWOAs) have been increasingly and widely adopted by Chinese government agencies to provide public services for the people. However, there is a lack of research concentrating on this subject; **Methods:** Based on 714 user survey results, the satisfaction and sustained intention models of GWOA were evaluated using Structural Equation Modeling (SEM); **Results:** factors including perceived usefulness, perceived ease of use, expectation confirmation, and network externality can positively affect GWOAs satisfaction and continuance, while the factor, perceived risk, can have negative effect on them. In the mediating effect analysis, users' satisfaction of GWOAs mediates the effects of perceived ease of use and perceived usefulness on GWOAs continuous use intention; network externality mediates the effects of perceived risk on GWOAs continuous use intention; users' both perceived usefulness and satisfaction of GWOAs mediate the effects of expectation confirmation on GWOAs continuous use intention.; **Conclusions:** perceived usefulness, perceived ease of use, expectation confirmation, network externality and perceived risk have been significant to determine users' satisfaction and continuous use intention of GWOAs. This research has potential application value in helping the government agencies, as operators of GWOAs, to enhance users' satisfaction and continuous use intention of GWOAs.

Keywords: Government WeChat Official Accounts, Structural Equation Modelling Approach, Continuous Use Intention

I. INTRODUCTION

Launched in 2011 and owned by Chinese internet and technology behemoth Tencent, WeChat (<https://www.wechat.com/en/>), a free messaging and calling application, dominates daily life in China since it functions as a hub for communication, multi-purpose social media, and mobile payments. As a platform offered by WeChat, WeChat Official Accounts Platform (<https://mp.weixin.qq.com>) allows individuals, businesses, governmental institutions and other organizations to access broader audiences through their official accounts. It can push articles timely and provide a more convenient two-way communication platform for users.

Registered by government agencies and other state organs, government WeChat official accounts (GWOAs) that concentrate on providing public services for the people anywhere anytime are the essential part of WeChat official accounts platform [1]. They have three main functions. The primary one is to build an authoritative platform for the release of national policies and government news, and it is convenient for the public to obtain government affairs information quickly, comprehensively, clearly and accurately. Second, they offer online approval platforms that break the time and space barrier, which change the traditional administrative approval work that could only be handled in person in physical government agencies, achieving the goal of carrying out Internet-based government affairs approval work for the public. And finally, they build a communication bridge between the government agencies and the public to facilitate the public to ask questions about government affairs through the Internet [2].

GWOAs have a huge number of users. With the innovation of Internet technology and the change of people's lifestyles, the channels for the public to obtain information are gradually diversified [3]. The Internet has become the key driver of changing government services, and more and more Internet users are using government official accounts to access government services conveniently and efficiently. After the outbreak of the COVID-19 epidemic, government agencies make extensive use of government official accounts to provide real-time, immediate and convenient services to avoid a large indoor crowd of people [4]. At the same time, residents are encouraged to submit government applications through GWOAs [5,6]. The visible future trend is that the traditional model of providing government services to residents through physical government agencies will gradually diminish, and more residents will choose Internet channels such as government official accounts to seek government services.

¹ Department of Basic Courses, Fujian Police College, Fuzhou 350007, China

² Department of Computer and Information Security Management, Fujian Police College, Fuzhou 350007, China

³ Department of Public Administration, Fujian Police College, Fuzhou 350007, China

⁴ Experiment Center, Fujian Police College, Fuzhou 350007, China

⁵ School of Humanities and Law, Fuzhou Technology and Business University, Fuzhou 350715, China

⁶ Institute of Forensic Science, Minhou Public Security Bureau, Fuzhou 350007, China

*Corresponding author: Xiaoping Lin, linxiaoping33@fjpsc.edu.cn

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Nonetheless, as an online government service, there are still several defects of government WeChat official accounts, which will hinder their development. Firstly, in terms of the pushing texts of political affairs, some of them are filled with many boring policy publicity texts whose discourse are long and uninteresting. It is difficult to make the public interested in reading such texts, but it will make people lose interest to read on [7]. Second, for their function design, some government WeChat official accounts ignore the interactive function, and consultations on government issues sometimes go unanswered [8]. Finally, considering security aspects, conducting government services through social media will bring higher privacy risks [9]. Some users have raised questions about their data security [10]. Overall, the rise of government WeChat official accounts supplement the form of government's public service delivery. In view of the above, to better satisfy public requirements of government service, government agencies, the owner of GWOAs, must adjust and improvements to existing GWOAs.

Based on the above, this study aims to identify the key factors influencing satisfaction and continuous use intention of GWOAs. Discussions are effectively implemented from the aspect of accounts' subscriber use and operation optimization for accounts owners, respectively. The degree of recognition (or objection) of such factors by users is integrated through user questionnaires, and the structural equation modelling (SEM) is adopted to explore these factors. The results of the current study could serve as a foundation for GWOA operators to develop strategies for enhancing their accounts as well as the reference indicator for subscribers using GWOAs.

Nowadays, users can effortlessly search and use GWOAs. Compared with physical government agencies, the increasing use of GWOAs could effectively reduce the cost of public to access government services, as well as the work pressure of government employees. For GWOAs operators, it is of great significance to know professional operation strategies for GWOAs and the basis for users to use GWOAs. Accordingly, this study is guided by the following two questions:

1. In using GWOAs, what factors will affect users' satisfaction?
2. In operating GWOAs, what influencing factors should be considered by operators to enhance users' continuance intention to use GWOAs?

This study engages in an in-depth discussion on seven factors that affect subscriber use of GWOAs, namely, perceived usefulness, perceived ease of use, expectation confirmation, perceived risk, network externality, satisfaction and continuous use intention, through GWOAs user questionnaires. Accordingly, research purposes of this study are as follows:

1. To discuss the factors influencing subscriber use of GWOAs through user questionnaires based on SEM.
2. To discuss the operator optimization strategies to enhance the operational effectiveness of GWOAs through user questionnaires.

A. *Government WeChat official accounts*

GWOA belongs to a type of government social media [11]. Social media has changed the way the government communicates with the public and actively encourages the public to participate in the government's decision-making process [12-14]. From the government's perspective, Reddick (2013) argued that factors, such as size of the government, the area of jurisdiction, type and form of government, the level of education and the experience in building e-government, affect the government adoption of local government social media [15]. From the public's perspective, Haro De Rosario's (2018) study found that, combined with the analysis of the public's use of government social media such as Facebook and Twitter, factors that are relevant to the public's satisfaction with the use of social media are the transparency and credibility of government information, the update speed of official government accounts and the frequency of interactivity offered by the government [16].

GWOAs enable citizens to have access to remote public services, such as payment of bills, enquires of taxation, application for government relief and online transfers, not in physical government agencies, but through the Internet via mobile phones [17]. With GWOAs, there is neither a physical agency nor counter staff, and citizens can gain the public services they need anytime and anywhere. By providing GWOAs, operators can benefit from many advantages and improve, such as reducing the time to handle government affairs as well as the cost and labor involved in establishing branches, to improve public services quality and user satisfaction [13].

Citizens can use GWOAs without purchasing any software or hardware devices, and they do not need to backup or store data since all transaction information is stored at the GWOAs terminal. However, GWOAs collect a lot of private information from the public in the process of use. The rights and interests of citizens would be damaged in the event of malicious attacks on GWOAs or operator misconduct, and citizen use of GWOAs will be further

influenced. Thus, GWOA operators must think about how to operate GWOAs to offer users a safe and sound using environment as well as how to increase user satisfaction with GWOAs and enhance their continuance intention.

B. *Perceived usefulness and perceived ease of use*

The Technology Acceptance Model (TAM, Fig1), was proposed by Davis (1989) [18] who created the model based on the Theory of Reasoned Action and used it to study the specific reasons why businesses or individuals use new technologies. In this model, perceived usefulness refers to the extent to which users perceive that using a technology will improve their working performance and be he useful and helpful to their lives. Perceived ease of use refers to the degree of operability, ease and practicality of learning and becoming proficient with the technology as perceived by users after using it. This model assumes that the attitude towards using, which is determined by perceived usefulness and perceived ease of use under the influence of external variables, indirectly affects users continuous use behavior, and at length influences actual system use through their willingness to use. However, this model is relatively simple, and researchers often add other research variables to supplement and extend the research, which is a more effective way that can explain users' technology acceptance behaviors [19].

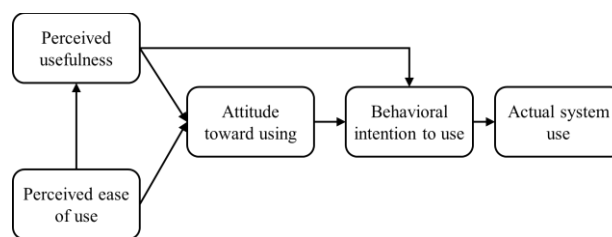


Figure 1. Technology acceptance model

In most previous studies discussing government social media, TAM was often adopted to study users' future willingness to use government social media [20]. In their study of online tax filing and service systems, Huang et al (2006) found that perceived ease of use was a decisive factor of users' long-term use of government service websites [21]. In other words, operators of government social media can enhance users' continuous use intention if government social media are designed to be easy and convenient to operate, and can improve users' using efficiency [20].

In TAM studies on government social media, perceived usefulness and perceived ease of use are important factors that influence not only users' satisfaction [22,23], but also users' willingness to continue using [24]. Zhu (2012) argued that perceived usefulness is a decisive factor in determining the public's satisfaction with using government websites when studying the factors influencing users' continuous use behavior [25].

Based on the above literature review, perceived usefulness and perceived ease of use were introduced to the research dimensions of this study. In this study, perceived usefulness is defined as the extent to which users find the medium helpful when using GWOAs. When the public perceive that they can obtain valuable information from the information of GWOAs, which can also meet their own needs of government services or improve their lives and using efficiency, they will be satisfied with the services provided by GWOAs, and thus increase their willingness to continue using GWOAs. Meanwhile, perceived ease of use is defined as the extent to which users regard that using GWOAs would be effortless. When the interface of GWOAs makes users feel simple, convenient and easy to use, it will increase users' satisfaction with GWOAs, and then enhance their willingness to continue using GWOAs.

C. *Expectation confirmation*

The expectation confirmation model of information system continuance (ECM-ISC, Fig2), was presented by Bhattacherjee (2001) on the basis of the expectation confirmation theory (ECT) to illustrate users' continuous use behavior [24]. In this model, the expectation confirmation is the subjective intention of users to repeatedly purchase or use a product. First, users unconsciously form certain perceptions about a product before they purchase or use it, expecting that the product will bring benefits to them or satisfy their needs. Then, after using this product, users will compare their actual feeling of using it with their expectation before using it, which will exert an impact on the perceived usefulness and satisfaction of the product. Ultimately, the effect of satisfaction with the product changes the willingness to continue using it and influences the users continuous use behavior [24]. ECM-ISC has been widely utilized by many researchers since its introduction [26-28], but, in some related studies, users' continuous

use intention is also frequently related to other factors such as user stickiness. Therefore, the ECM-ISC model is constantly being expanded and modified to better explain users' continuous use intention [29,30].

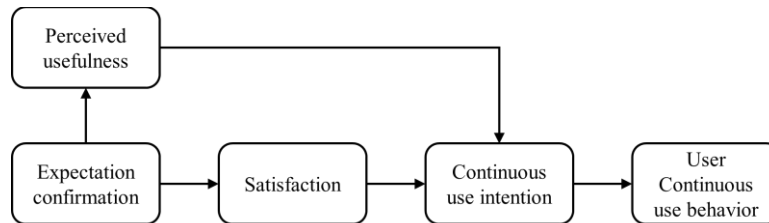


Figure 2. The expectation confirmation model of information system continuance

In the ECM-ISC study on government social media, the influence of users' expectation confirmation on perceived usefulness was confirmed [31]. Meng and Zhu (2018) concluded that the expectation confirmation of mobile social media user exerts a positive influence on perceived usefulness and satisfaction, with higher expectation followed by higher perceived usefulness; this then increased usage satisfaction, which in turn enhanced continuous use behavior [32].

According to the above literature review, expectation confirmation is regarded as one of the research dimensions of this study and refers to the extent of users' perception of the congruence between users' expectation and their actual feeling. When users perceive that their perception of actual experience about using a GWOA is higher than that of expectation use, the perceived usefulness will be enhanced, which in turn will increase the usage satisfaction and eventually boost the users' continuous use intention.

D. Perceived risk and network externality

In the process of using information systems, users are often influenced by the quality and security of information platforms [33]. Perceived risk is part of the quality of platform, and it refers to the uncertainty that users cannot predict the good or bad changes that a product will bring when they purchase or use it [13]. For instance, the public will have concerns about personal information and privacy leaks, information not being submitted correctly, and usage behavior being recorded and tracked before using GWOAs. For a long time, researchers have agreed that perceived risk is a significant negative factor affecting citizens' use of e-government platforms [29]. Those studies found that the higher the public's recognition of the security and reliability of the Internet environment, the more inclined they are to use e-government services [34]. And if users think the security of a government platform is low, they will abandon the online government platform and use offline services instead [35].

Network externality manifests the extra utility connected with an increased number of users (Strader et al., 2007; Dickinger et al., 2008) [36,37]. It refers to the influencing effect of the number of external users on the users' willingness to continue using the system service, the users' willingness to use the service increases with the number of users [38]. It consists of direct and indirect externality. The quantity of users is correlated with direct externality. When a user base grows, it becomes possible for individual users to use mobile phones to connect with additional peers. When the number of users rises, extra complimentary functions and services become available to users, which is known as an indirect externality [39]. In previous study, the security of information platforms is often also linked to the perception of network externality, and users' perceived risk has a significant negative impact on their perception of externalities [40]. Zhou concluded that mobile communication, as an interactive information technology, generates significant externalities that positively affect users' willingness to use [39].

According to the above literature review, perceived risk and network externality were included in the research dimensions of this study. In this study, perceived risk refers to the risk that users perceive and sense in using GWOAs, such as leakage of personal information, operation system errors and bogus hyperlinks. Network externality is defined that in using GWOAs, users consider the number and frequency of people using GWOAs surrounding them. It is one of the most important determinants of users' intentions to adopt interactive information technologies. When users receive more perceived risk about GWOAs, the network externality in their perception will decrease, and low externality will significantly reduce users' willingness to continue using. In other words, the less perceived risk about GWOAs, the more network externality users will perceive, thus enhancing users' willingness to continue using it.

E. *Satisfaction and continuous use intention*

In recent years, satisfaction and continuous use intention have been widely discussed in the field of e-commerce and government studies, with the former considered to significantly and positively influence the latter, and both are regarded as key factors influencing users' stickiness and loyalty [40,41]. Satisfaction means that the user has a pleasant psychological state after using certain products and services. Continuous use intention refers to the subjective intention to continue using a product or service after using it for a certain period of time. Prior scholars have repeatedly confirmed that user satisfaction exerts a positive impact on continuous use intention in retail and information technology settings [42-44].

Based on the above literature review, satisfaction and continuous use intention are included in the research dimensions of this study. In this study, satisfaction refers to the level of pleasurable psychological state of users after using GWOAs. Continuous use intention is the subjective level of users' willingness to continue using GWOAs after using them for a period time. Meanwhile, users will be more willing to use GWOAs if they are more content with GWOAs.

II. MATERIALS AND METHODS

A. *Research hypotheses*

Based on the literature review, a research model reflecting user satisfaction and continuous use intention towards GWOAs is shown in Fig3.

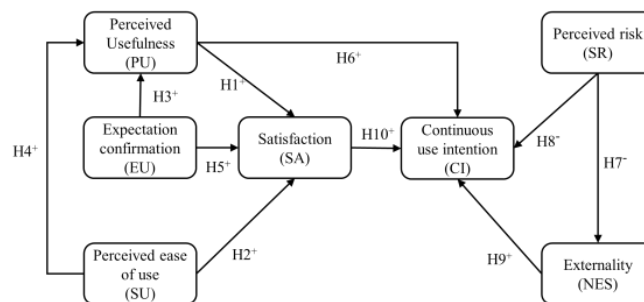


Figure 3. Research model

We can propose the following hypotheses:

- H1⁺**. Perceived usefulness will positively affect user satisfaction of GWOAs (PU→SA).
- H2⁺**. Perceived ease of use will positively affect user satisfaction of GWOAs (SU→SA).
- H3⁺**. Expectation confirmation will positively affect perceived usefulness of GWOAs (EU→PU).
- H4⁺**. Perceived ease of use will positively affect perceived usefulness of GWOAs (SU→PU).
- H5⁺**. Expectation confirmation will positively affect user satisfaction of GWOAs (EU→SA).
- H6⁺**. Perceived usefulness will positively affect users' GWOAs continuance intention (PU→CI).
- H7⁻**. Perceived risk will negatively affect user perceptions regarding network externality to GWOAs (SR→NES).
- H8⁻**. Perceived risk will negatively affect users' GWOAs continuance intention (SR→CI).
- H9⁺**. Network externality will positively affect users' GWOAs continuance intention (NES→CI).
- H10⁺**. User satisfaction will positively affect users' GWOAs continuance intention (SA→CI).
- H11⁺**. User satisfaction of GWOAs positively and significantly mediates the relationship between perceived usefulness and users' GWOAs continuance intention (PU→SA→CI).
- H12⁺**. User satisfaction of GWOAs positively and significantly mediates the relationship between expectation confirmation and users' GWOAs continuance intention (EU→SA→CI).
- H13⁺**. Perceived usefulness and user satisfaction of GWOAs positively and significantly mediate the relationship between expectation confirmation and users' GWOAs continuance intention (EU→PU→SA→CI).
- H14⁺**. Perceived usefulness positively and significantly mediates the relationship between perceived ease of use and users' GWOAs continuance intention (SU→PU→CI).

H15⁺. User satisfaction of GWOAs positively and significantly mediates the relationship between perceived ease of use and users' GWOAs continuance intention (SU→SA→CI).

H16⁺. Perceived usefulness and user satisfaction of GWOAs positively and significantly mediate the relationship between perceived ease of use and users' GWOAs continuance intention (SU→PU→SA→CI).

H17⁻. Network externality negatively and significantly mediates the relationship between perceived risk and users' GWOAs continuance intention (SR→NES→CI).

B. Instrument

All constructs in the current study are borrowed from the previous well-established studies to make certain that content is valid. The scale is shown in Table 1. The TR item: "I have easy access to the reliable information through GWOAs." in Perceived risk (SR), is a reverse counting item.

For this part, the five-point Likert scale was adopted to measure these variables, with response choices ranging from Strongly Disagree=1; Disagree=2; Undecided=3; Agree=4; and Strongly Agree=5, which was applied to examine factors related to users' continuance intention of GWOAs. The researcher invited a professional Chinese-English translator to perform the English to Chinese translation work, and subsequently the translator performed a back-translation procedure to ensure the validity of the translation from the original English items to the Chinese scale. Inviting 15 GWOAs users, the researcher also conducted a pilot test to further examine the clarity and readability of the instrument. The final scale is displayed in Table 1.

Table 1. Questionnaire measurement indicators and sources

Variable	Item	Measurement standard	source
Usefulness (PU)	PU1	I easily find the valuable information I need through GWOAs	[45][46]
	PU2	The services provided by GWOAs have been useful to me.	[47]
	PU3	GWOAs are helpful to my working, study and daily life.	
Expectation	EU1	I feel the services provided by GWOAs are better than I expected.	[45][29]
Confirmation (EU)	EU2	I feel GWOAs are better than I expected after using them.	[48]
	EU3	Most of my expectations for using GWOAs have been confirmed.	
Perceived Ease of Use (SU)	SU1	I think it is easy to learn how to use GWOAs.	[45][49]
	SU2	The interface layout of GWOAs is easy to operate.	
Perceived Risk (SR)	TR	I have easy access to the reliable information through GWOAs (reverse counting).	[13][50]
	SR1	My personal information on GWOAs can be compromised.	
	SR2	My behaviour on GWOAs can be traced and analyzed.	
	SR3	I am concerned about data privacy protection on GWOAs.	
Network Externality (NES)	NE1	People around me also use GWOAs.	[51][13]
	NE2	People around me has ever recommended GWOAs to me.	
	NE3	usage intention of people around me would affects mine.	
Satisfaction (SA)	SA1	Frequent using GWOAs is a wise choice for me	[13][50]
	SA2	All the services provided by GWOAs have made me very satisfied.	
	SA3	All my experiences about using GWOAs have made me pleasant.	
Continuous use intention (CI)	CI1	I will also use GWOAs for gaining information in the future.	[20][49]
	CI2	I will increase the frequency and time of using GWOAs in the future.	[29]
	CI3	I will recommend GWOAs to people around me in the future.	

C. Data collection

The participants should have certain usage experience of GWOAs since the objective of the present study is to explore users' GWOAs usage behaviour. Therefore, the scale was distributed through three GWOAs in Fuzhou City, Fujian Province, China, and the filter conditions were limited to users who had GWOAs usage experience. At the same time, the screening question "Has the respondent who is answering the questionnaire ever used a GWOA?" was set before the participant fills out the questionnaire, and only those who answered that they had used a GWOA could continue to fill out the scale. Meanwhile, a China's famous network survey platform (WJX.CN) was used to collect empirical data in the current study. The survey was released on three GWOAs and its data collection process

lasted for two weeks (from January 13, 2023 to January 27, 2023). Questionnaires submitted after the survey deadline will not be counted.

D. Ethical considerations

All procedures of this study were in accordance with the ethical standards of the institutional research committee and the Helsinki Declaration. This study has been approved by the academic and ethics committee of Fujian Police College.

Participants' consent was also obtained at the time of completing the questionnaire. Prior to the start of the study, participants were informed of the purpose of the study and the tasks to be completed in the study, and confirmed that they fully understood the study and responded, "I fully understand the study and volunteer to participate". In addition, the first part of the questionnaire was informed consent, where participants were asked to read the informed consent form and answer the questions "Do you wish to participate in this study" and "Do you wish your findings to be used for academic research". Selecting "No" to either of these two questions will automatically close the questionnaire and end the response.

The researchers pay attention to the privacy protection of users during the survey process. They were concerned about the impact of privacy problems on the study and assured participants that all the information provided by users would be kept strictly confidential and would be used only for the academic research purpose [52].

E. Data analysis

Statistical Package is used for statistical treatment, which includes descriptive statistics and inferential statistics in this study, to analyze the data collected and interpret them into comprehensible and useful results. This study utilizes IBM Statistical Package for the Social Science (SPSS) and AMOS version 26 software. Meanwhile, the internal consistency of the questionnaire can be ensured through performing the analysis of the Cronbach's Alpha coefficient and the Corrected Item-Total Correlation (CITC). In addition, the present study applies confirmatory factor analysis (CFA) to assess the validity. In order to ensure that the data are appropriate for CFA, the study first examine exploratory factor for checking correlation matrix, anti-image correlation matrix and the Kaiser-Meyer-Olikn (KMO) and Bartlett's sphere by SPSS. Maximum Likelihood (ML) for structural equation models (SEM) has been chosen to conduct model evaluation. This study sets its statistical significance at $p < 0.05$.

III. RESULTS

A. Demographic characteristics of respondents

A total of 800 questionnaires were returned in this study. All responses were carefully examined and the researchers discarded those completed within one minute, and those whose answers are same for all questions; among those obtained, finally, 741 questionnaires were deemed valid. The effective recovery rate was 92.63%. The demographic characteristics of the respondents, revealed in Table 2, have taken gender, age, education background, occupation, and frequency of GWOAs usage into consideration. Overall, the survey results show that 53.6% of the participants were male; 64.5% were between the ages of 21 and 40; 67.0% had received higher education, and 53.5% used GWOAs two to three times a week or more.

Table 2. Demographic characteristics of respondents.

Characteristic	Variables	Frequency	Percent (%)
Gender	Male	397	53.6
	Female	344	46.4
Age	≤20	112	15.1
	20-30	262	35.4
	30-40	216	29.1
	40-50	103	13.9
	≥50	48	6.5
Education background	No degree	245	33.1
	Bachelor	445	60.1
	Master & PhD	51	6.9
Occupation	Student	113	15.2
	Employee of government or other public institutions	187	25.2
	Employee of private enterprises or other non-public institutions	311	42.0

	Others	130	17.5
Frequency of Use	Seldom	219	29.6
	Two to three times a month	126	17.0
	Two to three times a week	234	31.6
	Everyday	162	21.9

B. Reliability and validity

CFA has been used to evaluate the validity and reliability of the scales. In the present study, seven dimensions' Cronbach's Alpha ranged from 0.795 to 0.827 (see Table 3), which was higher than the recommended value of 0.6, showing that the intrinsic consistency reliability of the scale questions was satisfactory [53]. CITI values of items in the study shown as followed table ranged from 0.503 to 0.743, which was over the recommended benchmark of 0.5, indicating that there are no subscales to be excluded from the scale [54]. The result of CFA found that the factor loading values higher than 0.6. AVE valued exceeded 0.5 which was higher than the suggested value produced by Hair, indicating adequate convergent validity [54]. The CR values were between 0.796 and 0.830, exceeding the recommended value of 0.7 for achieving good convergent validity of the constructs [56]. Thus, all the constructs are proven to be reliable and verified for further analysis.

Table 3. Reliability and validity of measurement model

Constructs	Items	CITC (>0.5)	Factor Loadings (>0.5)	Cronbach's Alpha	SMC	CR (>0.7)	AVE (>0.5)
PU	PU1	0.691	0.826	0.808	0.682	0.811	0.590
	PU2	0.665	0.779		0.607		
	PU3	0.613	0.693		0.480		
EU	EU1	0.681	0.813	0.801	0.661	0.806	0.583
	EU2	0.582	0.652		0.425		
	EU3	0.680	0.815		0.664		
SU	SU2	0.664	0.795	0.798	0.632	0.798	0.665
	SU1	0.664	0.835		0.697		
SR	TR	0.503	0.558	0.812	0.311	0.826	0.549
	SR1	0.737	0.845		0.714		
	SR2	0.711	0.834		0.696		
	SR3	0.598	0.690		0.476		
NES	NE1	0.652	0.776	0.795	0.602	0.796	0.565
	NE2	0.633	0.742		0.551		
	NE3	0.629	0.736		0.542		
SA	SA1	0.652	0.748	0.813	0.560	0.814	0.593
	SA2	0.662	0.763		0.582		
	SA3	0.681	0.799		0.638		
CI	CI1	0.636	0.707	0.827	0.500	0.830	0.622
	CI2	0.674	0.761		0.579		
	CI3	0.743	0.887		0.787		

Note. CITC = Corrected Item-Total Correlation, SMC = Square Multiple Correlations, CR = Composite Reliability, AVE = Average Variance Extracted

Table 4 shows that the square root of AVE is greater than its Pearson correlation coefficient, indicating that the discriminant validity of the scale in this study is better [57].

Table 4. Discriminative validity analysis result

Constructs	Convergent Validity (AVE)	Discriminant Validity						
		CI	SA	NES	SR	EU	PU	SU
CI	0.622	0.789						
SA	0.593	0.607	0.770					
NES	0.565	0.511	0.439	0.752				
SR	0.549	-0.368	-0.402	-0.188	0.741			
EU	0.583	0.59	0.539	0.384	-0.426	0.764		
PU	0.590	0.578	0.512	0.435	-0.373	0.573	0.768	
SU	0.665	0.623	0.573	0.416	-0.332	0.491	0.536	0.815

Note. Square root of AVE in hold on diagonals. Off diagonals are Pearson correlation of constructs

C. Model fit and model result

SEM result was showed in Table 5. All the parameters, i.e. CMIN/df(=4.718<5.0), GFI(=0.902>0.90), AGFI(=0.873>0.85), CFI(=0.903>0.90), IFI(=0.904>0.90) and RMSEA(=0.071<0.08) met the standard, indicating that the model was reliable.

Table 5. Fit indices for the structural model

Index	Statistical Values Obtained from Analysis		Value
	Criterion		
	Acceptable	Good	
CMIN/df	<5.0	<3.0	4.718
GFI	>0.90	>0.95	0.902
AGFI	>0.85	>0.9	0.873
CFI	>0.90	>0.97	0.903
IFI	>0.90	>0.95	0.904
RMSEA	<0.08	<0.05	0.071
Model Summary			Acceptable

D. Hypothesis testing

The structural model was evaluated by using software AMOS 28.0 to determine the importance of the paths. Bootstrap detection was performed on the samples using the bootstrap method with 5000 cycles, and the results are shown in Figure 4. According to the results of this study (shown in table 6), perceived usefulness significantly and positively impacted satisfaction and users' GWOAs continuance intention ($\beta= 0.149, t=2.228, p<0.05$ and $\beta=0.310, t=6.605, p<0.001$). Hence, H1 and H6 were supported. Perceived ease of use significantly and positively impacted satisfaction and perceived usefulness of GWOAs ($\beta=0.346, t=10.046, p<0.001$ and $\beta=0.308, t=6.799, p<0.001$). Hence, H2 and H4 were supported. Expectation confirmation significantly and positively impacted perceived usefulness and satisfaction of GWOAs ($\beta=0.346, t=10.046, p<0.001$ and $\beta=0.308, t=6.799, p<0.001$). Hence, H3 and H5 were supported. Perceived risk significantly and negatively impacted network externality and users' GWOAs continuance intention ($\beta=-0.210, t=-4.134, p<0.001$ and $\beta=-0.083, t=-2.482, p<0.05$). Hence, H7 and H8 were supported. Network externality significantly and positively impacted users' GWOAs continuance intention ($\beta=-0.210, t=-4.134, p<0.001$ and $\beta=-0.083, t=-2.482, p<0.05$). Hence, H9 was supported. User satisfaction significantly and positively affect users' GWOAs continuance intention ($\beta=0.309, t= 7.782, p<0.001$). Hence, H10 was supported.

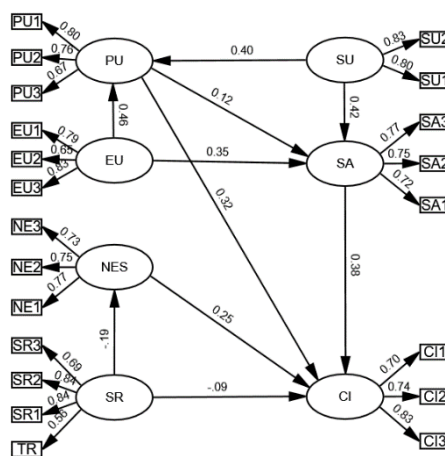


Figure 4. Diagram of structural equation model.

Table 6: Hypothesis results for the structural model (A): direct effects

Hypothesis	Path	Beta	S.E.	T	P	Decision
H1 ⁺	PU->SA	0.149	0.067	2.228	0.026	Accepted
H2 ⁺	SU->SA	0.377	0.046	8.101	0.000	Accepted

H3 ⁺	EU->PU	0.346	0.034	10.046	0.000	Accepted
H4 ⁺	SU->PU	0.297	0.035	8.557	0.000	Accepted
H5 ⁺	EU->SA	0.308	0.045	6.799	0.000	Accepted
H6 ⁺	PU->CI	0.310	0.047	6.605	0.000	Accepted
H7 ⁻	SR->NES	-0.210	0.051	-4.134	0.000	Accepted
H8 ⁻	SR->CI	-0.083	0.033	-2.482	0.013	Accepted
H9 ⁺	NES->CI	0.197	0.032	6.071	0.000	Accepted
H10 ⁺	SA->CI	0.309	0.040	7.782	0.000	Accepted

E. Mediating effect analysis

The standard bootstrapping (5000 bootstrap samples) was used with 741 sample observations for the current study to examine whether three mediating variables, namely SA, PU and NES, are mediators in a real sense or not [58]. Following the methodological hints in the Minet.al (2020) study, the presence of mediating effects can be estimated using structural equation modeling (ref Table 7, Fig 4) [59].

The findings (shown in Table 7) reveal that SA positively and significantly mediates the relationship between PU and CI ($\beta=0.046, Z=2.091, p < 0.05$). SA positively and significantly mediates the relationship between EU and CI ($\beta=0.095, Z=3.276, p < 0.05$). PU and SA positively and significantly mediate the relationship between EU and CI ($\beta=0.016, Z=2.000, p < 0.05$). PU positively and significantly mediates the relationship between SU and CI ($\beta=0.092, Z=3.407, p < 0.05$). SA positively and significantly mediates the relationship between SU and CI ($\beta=0.116, Z=3.515, p < 0.05$). PU and SA positively and significantly mediate the relationship between SU and CI ($\beta=0.014, Z=2.000, p < 0.05$). NES negatively and significantly mediates the relationship between SR and CI ($\beta=-0.041, Z=-3.154, p < 0.05$). Therefore, supporting all the mediating hypotheses (H11⁺, H12⁺, H13⁺, H14⁺, H15⁺, H16⁺ and H17⁻).

Table 7. Hypothesis results for the structural model(B): direct effects and indirect effects

Path	Point estimate	Product of Coefficients		Bootstrap 5000 times 95% Confidence Interval						Decision
		SE	Z	Bias-corrected			Percentile			
				Lower	Upper	p	Lower	Upper	p	
Direct effects										
SU→SA	0.377	0.059	6.390	0.268	0.498	0.00	0.264	0.494	0.00	
EU→SA	0.308	0.056	5.500	0.204	0.426	0.00	0.197	0.418	0.00	
PU→CI	0.310	0.070	4.429	0.183	0.463	0.00	0.183	0.462	0.00	
SR→CI	-0.083	0.036	-2.306	-0.156	-0.015	0.01	-0.155	-0.014	0.01	
SA→CI	0.309	0.061	5.066	0.199	0.438	0.00	0.194	0.430	0.00	
Indirect effects										
H11 ⁺ :PU→SA→CI	0.046	0.022	2.091	0.008	0.094	0.01	0.006	0.092	0.02	Accepted
H12 ⁺ :EU→SA→CI	0.095	0.029	3.276	0.048	0.164	0.00	0.045	0.156	0.00	Accepted
H13 ⁺ :EU→PU→SA→CI	0.016	0.008	2.000	0.003	0.034	0.01	0.002	0.032	0.02	Accepted
H14 ⁺ :SU→PU→CI	0.092	0.027	3.407	0.048	0.156	0.00	0.046	0.154	0.00	Accepted
H15 ⁺ :SU→SA→CI	0.116	0.033	3.515	0.061	0.190	0.00	0.059	0.184	0.00	Accepted
H16 ⁺ :SU→PU→SA→CI	0.014	0.007	2.000	0.003	0.030	0.01	0.002	0.028	0.02	Accepted
H17 ⁻ :SR→NES→CI	-0.041	0.013	-3.154	-0.076	-0.022	0.00	-0.070	-0.019	0.00	Accepted

IV. DISCUSSION

1. With the current framework incorporating five factors, namely, perceived usefulness, perceived ease of use, expectation confirmation, perceived risk, network externality, to explain user satisfaction of GWOAs ($R^2=40.0\%$) and continuous use intention ($R^2=48.3\%$), the objective of this study is to examine the behavioral intention to use GWOAs through integrating the “Technology Acceptance Model (TAM)” and “the expectation confirmation model of information system continuance (ECM-ISC)”. Incorporating perceived risk and network externality as a context creates an extended framework of TAM and ECM-ISC, and in turn the model’s predictive ability has been increased.
2. Perceived usefulness and perceived ease of use significantly affect user satisfaction with GWOAs, which is relevant to the prior studies [21,60]. For the online-based platform, users’ perceived usefulness and perceived ease of use about the platform are increased if they believe that the system provides clear, accurate, comprehensible, up-to-date and high-quality information [61]. The results from the structural equation model also indicated that perceived usefulness and perceived ease of use exert impact on users’ continuous use intention through a mediator (satisfaction), which is of great importance to earlier studies [24][62]. Currently, the Chinese Internet and social media are full of commercialized and fragmented information, which makes it very difficult to verify the authenticity and quality of information, and to distinguish the traceability and credibility of information [63]. When society is flooded with all kinds of information that makes users confused, the credible information provided by GWOAs is crucial for users, which also becomes the reason to enhance satisfaction and increase the continued usage behaviour[25]. Government agency officials, as operators of GWOAs, should optimize the content of GWOAs and deliver more convenient and fast online government services, and strengthen convenient measures to serve the elderly and people who have communication disabilities, such as visual or hearing disabilities. At the same time, they should publish authoritative information on issues of public concern on time to enhance the public’s perceived ease of use and perceived usefulness of GWOAs.
3. The model validation results of the structural equation modelling show that expectation confirmation will positively affect user perceived usefulness of GWOAs, which is identical to the existing studies [29][64]. From the results of this study, expectation confirmation enhances users’ satisfaction of using GWOAs by increasing perceived usefulness. This suggests that the public will be more inclined to increase their impression of the usefulness of GWOAs if they have higher expectation confirmation, resulting in a stronger interest and gradually a greater tendency to use GWOAs [65]. Government agency officials, as operators of GWOAs, should continuously optimize the functions of GWOAs and improve information access and availability of services to meet users’ expectation, which can better enhance their expectation confirmation and thus improve public perception of the perceived usefulness of GWOAs, and eventually user satisfaction with GWOAs also increased.
4. The network externality of GWOAs is a significant factor influencing continuous use intention, which supports earlier studies [39]. Network externality expresses a particular kind of influence that other people who use that Internet medium have on the user [66,67]. Collectivism is more prominent in China [68], which seems to indicate that Chinese people tend to be more aligned with others. This is also true in e-government, as users’ perception of the people usage of GWOAs around them becomes stronger, the more users will increase their willingness to continue using GWOAs. At the same time, the development trend of electronic government services is obvious in China. When a certain government service is updated, people frequently know the new functions and government services through word of mouth, which is often more effective than the official publicity. Government agency officials, as operators of GWOAs, should promote the functions of GWOAs to more people, especially those who are familiar with electronic and digital products but do not know about GWOAs, by means of enhanced publicity. In addition to strengthening the promotion of the use of GWOAs, they can consider increasing the incentive mechanism for inviting new users, just like commercial companies promoting new products. Although it is unlikely that the government will give substantial incentive supports, slogans such as “Your publicity may help more people to avoid troubles of running around physical government buildings” may enhance users’ willingness to promote GWOAs, to take advantage of the convenience and high-efficiency of GWOAs.
5. Perceived risk has a significant negative impact on network externality, but not on users’ continuous use intention, which is significant to previous studies [69]. Traditionally, researchers considered that perceived risk perception can be understood as an important factor limiting users’ continuous use intention [70], but in model validation of the structural equation modelling, the results are not obvious. For users, perceived risk mainly affects their perception of network externality of others around them, and does not directly affect their willingness to continue using GWOAs. This may be related to the administrative background of GWOAs, on the one hand, the exclusivity

of GWOAs is extremely strong. If a complete GWOA has been established, there is certainly no need for the government to operate another GWOA with similar functions, so users have only a single choice. Obviously, this is different from the business competition. When the user doubts the security of GWOAs, the relevant government agency does not have a rival, and the user has no choice but to only move from online to offline. However, perceived risk doesn't totally have no impact on the public's willingness to continue using GWOAs. Government agency officials, as operators of public government services, should still give priority to keep user privacy, confidentiality, data transmission and storage security, and avoid leakage of data that citizens use to apply for GWOAs [71].

6. The results of the current study provide some perspectives for the government agencies that operate GWOAs, which allow them to recognize the influencing factors and their mediating processes that affect users' willingness to continue using GWOAs. The research finding suggests that the effect of perceived ease of use and perceived usefulness on continued use intention is found to be mediated by satisfaction. Regarding operators of GWOAs, it is important to place reliable and high-quality information with public government services on government websites or social media to create a better impression on the mindset of users. Operators should focus on uploading real, useful and easy-to-understand information about government services to promote government websites and the government services they support on social media sites to increase users' willingness to continue using GWOAs [72].

The current research finds that the effect of perceived risk on continuous use intention is mediated by network externality. Internet users tend to attain more information related to the Internet service before using it, where the risk of using the Internet products and the number of people who are using it are the main points of their reference. Therefore, to increase users' willingness to continue using GWOAs, operators should ensure that systems related to government services are secure, reliable, and trustworthy from communication processes to data storage. Furthermore, apart from the required manual review, enhancing automated computer and application software review, and Artificial Intelligence-led electronic intelligence review should also be taken into consideration to prevent the risk of privacy leakage and data insecurity brought about by manual checking. Additionally, operations staff should closely track and monitor the latest comments from GWOAs users on Social Network Services media to stay informed about the real-time security features of the system and the current views of users.

The findings reveal that expectation confirmation affects the continuous use intention through two mediators, namely perceived usefulness and satisfaction. Internet users often utilize search engines to seek more information before deciding to use an online or offline service. Then, they will clarify what kinds of feedback they can get through the service [73]. GWOAs operators may think of combining powerful function of WeChat Moments, an Instagram-like feed where users can upload their posts, to develop lively publicity pages [74], and share the latest updates about GWOAs and e-government services. Thus, online users can gain authentic and complete information on social media sites to reduce over-expectation due to asymmetric relationship. At the same time, operators should also provide convenient communication channels, such as the Internet and telephone customer service, or leveraging social media platforms like WeChat, to help answer citizens' questions quickly and offer timely and effective technical guidance, as far as possible to avoid the situation where user expectations have been crashed.

7. Overall, the current findings point out that in the process of using GWOAs, factors namely, satisfaction, perceived ease of use, perceived usefulness, expectation confirmation, perceived risk, and network externality, ultimately influence users' willingness to continue using GWOAs. For this reason, GWOAs operators may consider enhancing their operation, management and business teams to increase user satisfaction. And they should provide useful, authentic, trustworthy, high-quality and understandable information in accordance with user requirements, which will affect users' continuous use behavior of GWOAs [75-77].

V. CONCLUSIONS

The current paper has presented the objective to explore the factors influencing satisfaction and continuous use intention of Chinese GWOAs by introducing psychological elements such as perceived risk, network externality, etc, and considering relevant components from TAM and ECM-ISC models. The study's research model has been validated through SEM, where 741 GWOAs users participated as respondents. The research findings signify that perceived ease of use, perceived usefulness, expectation confirmation, perceived risk, and network externality of GWOAs have been crucial in influencing user satisfaction and form continuous use behaviour of GWOAs. From the operational perspective, it has been pointed out that government agencies, as operators of GWOAs, should utilize the power of the Internet to gauge user behaviour by concentrating on improving the ability of government services, fully satisfying users' needs, meeting their expectations, and further improving the ease of operation and

use, and avoiding the risk of information leakage by strengthening security. Therefore, users can gain a better experience, and their satisfaction and continuous use intention of GWOAs would be enhanced.

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