Research On the Influence of Information Ecological Imbalance on Elderly User's Use sBehavior of G2C E-Government

By

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Abstract

The theory of information ecology is a new subject which analyzes the imbalance in supply chain information management by combining the theory of supply chain management, and puts forward corresponding countermeasures from the perspective of information ecosystem balance. In fact, no matter how advanced the information technology is, the premise of its existence is to serve mankind. In society, there is a group of people that can't be ignored - the elderly. When advanced technology no longer serves the elderly, they are frequently labeled as "refugees on the Internet" and "islands of information". In the special time interval of the global COVID-19 epidemic, this situation is getting even worse. Then what is the reason? That's exactly the theme of this paper, including the impact of information ecological imbalance on the willingness of the elderly to learn information technology, and the impact on the use behavior of G2C elderly users.   It is hoped that through the discussion of the actual situation of the elderly using G2C under the imbalance of information ecology, more people such as the researchers of G2C, the designers of information products and applications, and the makers of Internet laws and mechanisms can understand the special needs of this group. It is also hoped that they should take into account the special needs of the elderly, provide them with information technology products that are more suitable for their use, and enjoy the convenience that information technology brings to their later life.

Keywords: Elderly ； G2C ； Information ecological imbalance ； Unified theory of acceptance and use of technology.

1. Introduction

The real cases and government data from the survey since the global COVID-19 show that in order to reduce exposure and avoid infection, as well as to facilitate people's daily life, the government has launched G2C. Indeed Information technology can make most people feel its speed and convenience, but for the elderly, they mostly feel helpless. The Internet world is not the real world for the elderly, nor a necessity of their life, and digital currency is even more elusive for them. It is a place where the aged are unwilling to step into and do not have enough ability to learn new knowledge. What is the current situation of the usage of G2C by the elderly? Whether such Internet system can not only provide convenience for the elderly, but also bring comfortable information technology experience to the elderly; Or just the opposite, did not bring convenient services to the elderly at all? Why do many government institutions ask the elderly to learn how to operate G2C in the daily news? This

paper will specifically state these problems through several cases: in some county towns, young people usually go out to work, and those who stay in their hometown are mostly old people and children. In the past, it was only necessary to go to the local government departments to handle affairs directly. However, due to the epidemic situation, the working methods of government departments have changed, that is, the masses themselves are required to handle business online through smart phones and other devices. Although this practice is in response to the epidemic prevention and control measures advocated by the state, it doesn't take into account the local actual situation, resulting in some disharmonious situations, for example, some elderly persons tried to pay the medical insurance on the rainy day, the staff refused the payment by cash on the grounds of epidemic prevention and control, and asked them to pay by themselves online. For an illiterate elderly whose children are not around, mobile phone payment is equivalent to a fantasy. (Jia Liang, 2020) In addition, when the local residents' committee conducted the census through G2C system, it was found that there were still many problems in the adaptability of the elderly group to such online way of working. For example, some of the elderly doesn't have mobile phones, thus online registration cannot be completed; Some do have smart phones, but they can't operate; After the staff taught them the operation procedures, they sometimes forgot them soon later. Some elderly people can't even write their own names, let alone use mobile phone to login programs to read questionnaires and other related documents (Zi Qiang, Yuan Huijing,&Liu Xiangxiao, 2020).

In China and even some developed countries, the elderly who do not know information technology are facing the dilemma of being isolated by the Internet world. Actually, there is a special group among the elderly, which is commonly known as "illiteracy" which refers to adults who cannot read and write. According to the definition of illiteracy in the new century by United Nations, illiteracy can be divided into three categories: firstly, people who cannot read and write, which is illiteracy in the traditional sense; Secondly, people who can't recognize the symbols of modern society (i.e. maps, graphs and other commonly used charts); The third category is people who cannot use computers for learning, communication and management (Ideological and political teaching, 2005). As of the sixth national census in 2010, there were 54million illiterates nationwide. Due to the implementation of the "nine-year compulsory education", it is expected that illiteracy among young and middle-aged people will be basically eliminated after 2011, and the remaining illiteracy will only appear in the elderly group (Chen Nuo, Huang Xiao, & Luo Fei, 2015). The trends of the elderly population in China have been studied and predicted by many scholars. And it is estimated that one of the challenges facing by China in the near future is the sustained and rapid aging of the population. At the time interval from 2015 to 2035, the proportion of elderly population is expected to double to 20% which means that by that time, the elderly population will account for 1 / 5 or 1 / 4 of China's population (Chen Wei, 2006).

At the same time, information technology represented by the Internet is developing rapidly all over the world. Diversified information technology is rapidly penetrating into every corner of life, gradually becoming an indispensable tool in life, which has a great impact on people's daily lifestyle. Besides, it is worth noting that although the proportion of the elderly in the entire population is increasing, the one in information technology users is still negligible. According to the data released by China Internet Information Center (abbreviated as CNNIC) in 《The 25th Statistical Report of China's Internet Development》 in January, 2010, Internet users over 60 years old only account for 1.9% of the total Internet users. Then the data released by CNNIC at the end of December, 2011 in 《The 29th Statistical Report of China's Internet Development》 showed that Internet users accounted for

38.3% of the national population, of which only 4.8% were over 50 years old. As of March 2020, 《The 45th Statistical Report of China's Internet Development》shows that the number of Internet users in China is 904 million, while the number of mobile Internet users is 897 million, among which the number of Internet users aged 50 accounted for 16.9% with the number exceeding 150 million which indicates that the Internet is continuously infiltrating into the middle-aged and elderly people (China Internet Network Information Center, 2010-2020). With the change of population composition, more and more elderly people will need to use all kinds of information technology in their daily life, otherwise they will not only have various inconveniences in life, but also face the risk of being isolated by society (marqui é & isingrini, 2001).

2. Objectives

Most elderly people clearly understand the benefits of information technology, but with the passage of time, they gradually age, with the physical condition, behavioral ability, learning memory, etc. declined, which also causes the difficulties in learning and using information technology, thus resulting in the loss of self-confidence of the elderly users in using such technology. Finally, the elderly is unwilling to use it any more (Wang Lin, 2010). However, in 2018, a survey involved 286 elderly and 339 young people conducted by the China Daily for the elderly on the learning of the intelligent devices. The results showed that 50% of the young people said they were only willing to spend 15 minutes to complete the study, but 80% of the elderly were willing to spend more time on that, moreover, many of them signed up for courses related to this learning in the University for the elderly (Guangzhou Daily, 2018). The above all reflect the actual situation of the elderly in learning and accepting such new technology. Do information technology systems such as G2C help the elderly solve the exact problems, or does it complicate the problems and increase the burden on the elderly? In this regard, this paper determines the research purposes, which can be summarized as the following aspects:

1. This paper explains that G2C is used as a tool to communicate between the government and the public which is also a representative carrier of intelligent information technology, and states the practical problems encountered by G2C elderly users.
2. Under the premise of information ecological imbalance, this paper expounds and analyzes the inherent thinking of society on the elderly, which lays a relevant foundation for helping elderly users of G2C overcome the usage difficulties.
3. Through the research on G2C elderly users, this paper hopes to raise this public problem to the level of public policy issues, and enable more people to pay attention to the dilemma faced by the elderly in using intelligent information technology.3. Materials and methods

This section should provide enough detail to allow full replication of the study by suitably skilled investigators. Protocols for new methods should be included, but well-established protocols may simply be referenced.

3. Materials and Methods

According to the implementation regulations of the "Calculation and management of China's endowment insurance fund" in 2000, "the retirement age of male workers is 60 years old, female workers is 50 years old, and the retirement age of female cadres is raised to 55 years old. However, with the continuous improvement of the living standards, the average life

expectancy of our population also increases, then the postponement of the retirement age is on the agenda." Therefore, the research object of this paper is mainly the elderly over the age of 50.

The scale source of question items refers to the research of Viswath Venkatesh & Fred D. Davis, UMSA Sekaran & Roger bougie, etc. see table 3-1 for specific items，of which the composition is as follows: six items of information ecological imbalance (Li Jiaxing, Wang Xiwei, Li SHIMENG, & Zhang Liu, 2017), three items of effort expectancy (Zhou, 2011), three items of performance expectancy (IM, Hong, & Kang, 2011), three items of social imfluences (Suhail, 2015), three items of facilitating conditions (Eric mailet a, 2014), three items of willingness to learn (Venkatesh & Davis, 2000) Three items of use behavior (Zhou, Lu, & Wang, 2010); Considering that the research object is the elderly, after evaluating all relevant conditions, this paper adopts Likert 5-level (Likert 5-level method) scale to measure a total of 27 question items: effort expectancy (EE), performance expectancy (PE), social influences (SI), facilitating condition (FC), willingness to learn (WL), use behavior (UB), and information ecological imbalance (IEI). The questionnaire survey of G2C elderly users has five levels of identification, from "very disagree", "disagree", "uncertain", "agree" to "very agree", and the corresponding scores of 1, 2, 3, 4 and 5 are given respectively.

Based on the above data, this paper adopts the cluster sampling method. refers to a sampling organization that selects sample units in clusters and conducts a comprehensive survey of the selected groups. For example, when inspecting the quality of a certain part, instead of taking parts one by one, several boxes (each box contains several parts) are randomly selected to conduct a comprehensive inspection on the selected boxes of parts (Feng Xiaotian, 2006) .

If there are 10 variables in this paper, the item $=10 \times 3$ (at least 3 questions for each variable) $=30$. It is more appropriate to set the sample size at 150-300. However, considering the various conditions that will occur when the sample is distributed, the questionnaire needs to be distributed to about 200-400. In addition, this study is the elderly people in the whole city, so the sample size is doubled to 400-800.Sample size calculation formula is $n=N/(1+N*e^2)$, among the formula, "n" represents the number of samples, "N" represents the overall number of respondents, "e" represents the acceptable error level, Set the error level E to 0.05,"N"=800 to select the maximum sample value. After calculation, the number of samples to be sampled is 267 (Feng Xiaotian, 2006).

Structural equation modeling (SEM), as a large sample analysis technology，is adopted in this paper. Under this model, it is generally required that the reasonable sample size is between 10 and 15 times of the measured variables, and when the number of samples is 200 to 400, a higher model fitting degree is required (Feng Xiaotian, 2006). After calculation, the number of samples to be sampled N is 267. In overall consideration, only when the sample extraction value is between 367 (267+100) -417 (267+150) can it meet the fitting requirements of SEM model. As a result, it is estimated that there will be at least 500 questionnaires to be issued, of which the effective questionnaire cannot be less than 417 sample sizes.

This paper adopts the questionnaire template of Sojump, which is a professional online questionnaire survey, evaluation and voting platform, focusing on providing users with powerful and humanized online questionnaire design, data collection, custom reports, and survey result analysis services. Compared with traditional survey methods and other survey

websites or survey systems, Sojump questionnaire has obvious advantages of being fast, easy to use and cost-effective, and has been widely used by a large number of enterprises and individuals. Finally, the questionnaire is sent to random respondents through mobile phones, computers and other Internet forms, so that it is suitable for random elderly users.

Reliability is reliability which refers to the consistency of the results obtained when the same method is used to measure the same object repeatedly. In other words, reliability refers to the consistency or stability of measurement results. The commonly used reliability includes retest reliability, alternate-form reliability and split-half reliability (Feng Xiaotian, 2006).

This paper uses Cronbach's alpha coefficient (Cronbach coefficient) to test the internal consistency reliability (ICR) contained in the questionnaire. The calculation formula is as follows:

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum s_i^2}{s_T^2}\right)$$

Where K represents the number of variables, Si represents the standard deviation of each variable score, and St represents the standard deviation of the total score. If the Cronbach's alpha score of the measurement questionnaire for factor demand satisfaction is 0.779, the Cronbach's alpha score of the measurement questionnaire for factor public acceptance is 0.750, the Cronbach's alpha score of the measurement questionnaire for factor perceived availability is 0.737, and the Cronbach's alpha score of the measurement questionnaire for factor help accessibility is 0.720, and finally if the Cronbach's alpha value is higher than 0.7, then it can be considered to be a high reliability.

Validity is accuracy which refers to the degree to which measuring tools or means can accurately measure the variables to be measured, or the degree to which the attributes of things can be accurately and truly measured. The validity of measurement has three different types, namely, surface validity, criterion validity and constructive validity (Feng Xiaotian, 2006).

This paper uses KMO test and Bartlett-test-of-sphericity to test the structural validity of the scale used in the questionnaire. Before the factor analysis, KMO test and Bartley sphere test are needed.

KMO (Full English Name: Kaiser Meyer Olkin) is an index used to compare simple correlation coefficient and partial correlation coefficient between variables. The calculation formula is as follow:

$$KMO = \frac{\sum \sum_{i \neq j} r_{ij}^2}{\sum \sum_{i \neq j} r_{ij}^2 + \sum \sum_{i \neq j} r_{ij \bullet 1,2 \cdots k}^2}$$

KMO is used to check the correlation and partial correlation between variables with the value to be between 0 and 1. The closer the value of KMO is to 1, the stronger the correlation between variables is, the weaker the partial correlation is, and the better the effect of factor analysis is. In practical analysis, the effect is better when KMO is above 0.7; When KMO is below 0.5, factor analysis method is not suitable in the model then. Furthermore, this is when we need to consider to redesign the variable structure or adopt other statistical analysis methods.

Bartlett-test-of-sphericity （Or Bartlett's test） is used to check whether the correlation between variables in the correlation matrix is a unit matrix, that is, to check whether each variable is independent. Before factor analysis, KMO test and Bartley sphere test are carried out first. In factor analysis, if the original hypothesis is rejected, it means that factor analysis can be done. While if the original hypothesis is not rejected, it means that these variables may provide some information independently and are not suitable for factor analysis. The formula is simplified as:

$$K^2 = \frac{1}{c}\left[(n-r)\left(lnMSe - lns_i^2\right)\right], \quad c = 1 + \frac{1}{3(r-1)}\left[\frac{r^2}{n-r} - \frac{1}{n-r}\right]$$

$$n = rn_i$$

Bartlett's spherical test results show that if the correlation matrix is a unit matrix, the independent factor analysis of each variable is invalid. When SPSS test results show sig< 0.05 (i.e. p value <0.05), it indicates that it meets the standard under which the data is distributed in a spherical shape, and each variable is independent of each other to a certain extent.

Construct validity refers to the correspondence between a certain structure reflected in the measurement results and the measured value. The method of construct validity analysis is factor analysis. Besides, the question that attracts the most attention, in the analysis is: what characteristics are actually measured by the scale? When evaluating construct validity, researchers should try to explain the theoretical problem of "why the scale is effective" and consider what inferences can be drawn from this theoretical problem. Construct validity includes homogeneous validity, heterogeneous validity and semantic logical validity. Some scholars believe that the most ideal method of validity analysis is to use factor analysis to measure the structural validity of the scale or the whole questionnaire. The main function of factor analysis is to extract some common factors from all variables (items) of the scale among which each common factor is highly related to a specific group of variables and also the basic structure of the scale. Through factor analysis, it can be detected that whether the questionnaire can measure a certain structure assumed by researchers when designing the questionnaire. Among the results of factor analysis, the main indicators used to evaluate construct validity are cumulative contribution rate, communality and factor load. Among them, the cumulative contribution rate reflects the cumulative effectiveness of common factors on the scale or questionnaire, the communality reflects the effectiveness of common factors to explain the original variables, and the factor load reflects the correlation between the original variables and a common factor (Feng Xiaotian, 2006).

Exploratory Factor Analysis （EFA） refers to a technology used to find out the original structure of multivariate observation variables which are to be dealt with

dimensionality reduction. Therefore, EFA can integrate variables with complex relationships into a few core factors. For principal factor analysis, there are no outliers, equidistant values, linear values, multivariable normal distribution and orthogonality in the process of analysis. This paper uses SPSS software to conduct exploratory factor analysis, mainly to find out the number of factors that affect the observed variables and the correlation between each factor or each observed variable, in order to reveal the internal structure of the variables with large value. The research hypothesis is that each index variable matches a certain factor, and the factor structure of the data can only be inferred by perception through the factor load (Wu Minglong, 2003).

Confirmatory factor analysis（CFA）refers to a statistical analysis of social survey data which tests whether the relationship between a factor and the corresponding measure term conforms to the theoretical relationship designed by researchers. Confirmatory factor analysis is often tested by structural equation modeling. In actual scientific research, the process of confirmatory factor analysis is also the test process of measurement model. In actual scientific research, the process of confirmatory factor analysis is also the test process of measurement model. In this paper, AMOS method is used for confirmatory factor analysis. The main purpose is to determine the ability of the model that defines factors in advance to fit the actual data, in order to test whether the number of factors and factor loads of observed variables are consistent with the expectancy based on the pre-established theory. Index variables are selected based on a priori theory, and factor analysis is used to see whether they are as expected. Its priori hypothesis is that each factor corresponds to a specific subset of indicator variables, and at least the number of factors in the model is required to be assumed in advance, but sometimes it is expected that which variables depend on which factor (Wu Minglong, 2009).

Structural Equation Model （SEM） refers to a statistical method to analyze the relationship between variables based on the covariance matrix of variables which is an important tool for multivariate data analysis. Analyzing data through structural equation modeling is a dynamic and continuous modification process. Therefore, the structural equation can be used not only as a validation model and a comparison model, but also as an evaluation model and a correction model. Some application personnel of structural equation models preset a model first, and then confirm this model with the sample data they have. If it is found that the preset model does not fit the sample data very well, then modify the preset model, and then test it again, and continue to repeat the process until a model is finally obtained. The application personnel believe that the data fitting degree in this model reaches his satisfaction as well as the model with reasonable explanations for the estimated values of various parameters (Wu Minglong, 2009).

4. Results

The results are shown in table1. The effort expectancy variable contains three items with the Cronbach's α coefficient to be 0.812；The performance expectancy variable contains three items with the Cronbach's α coefficient to be 0.820；The social influence contains three items with the Cronbach's α coefficient to be 0.796；The facilitating conditions contains three items with the Cronbach's α coefficient to be 0.777；The willingness to learn contains three items with the Cronbach's α coefficient to be 0.802；The use behavior contains three items with the Cronbach's α coefficient to be 0.815；Information ecological imbalance contains six items with the Cronbach's α coefficient to be 0.898；The

global scale contains items with Cronbach's α coefficient to be 0.898; The Cronbach's α coefficients of the deleted items aren't greater than Cronbach's α coefficients of all the variables. In addition, the CITC between the observed variables and their latent variables is mostly between 0.6~0.85, which meets the requirement of greater than 0.5, which indicates that the correlation coefficient CITC between each variable and the observed variables and their latent variables exceeds 0.5, and most of them are between 0.6-0.85, which indicates that the latent variables of each question are set well, indicating that the overall reliability of the questionnaire is very high. Meanwhile, the Cronbach's α coefficient is greater than 0.8, indicating that the reliability level of the questionnaire is high with high internal consistency and stability of the scale.

Table 1 *Reliability test of each variable*

Variable	Item	CITC	Cronbach's Alpha of deleted item	Cronbach's Alpha
Effort expectancy	EE1	0.658	0.746	
	EE2	0.639	0.768	0.812
	EE3	0.691	0.713	
Performance expectancy	PE1	0.723	0.704	
	PE2	0.642	0.786	0.820
	PE3	0.669	0.759	
Social influences	SI1	0.607	0.758	
	SI2	0.605	0.758	0.796
	SI3	0.719	0.634	
Facilitating conditions	FC1	0.594	0.721	
	FC2	0.607	0.709	0.777
	FC3	0.651	0.662	
Willingness to learn	WL1	0.679	0.704	
	WL2	0.639	0.739	0.802
	WL3	0.641	0.739	
Use Behavior	UB1	0.646	0.769	
	UB2	0.641	0.770	0.815
	UB3	0.729	0.683	
Information ecological imbalance	IEI1	0.758	0.876	
	IEI2	0.721	0.881	
	IEI3	0.659	0.890	0.898
	IEI4	0.812	0.867	
	IEI5	0.712	0.883	
	IEI6	0.689	0.886	
Global scale			0.871	

The test results show that KMO of the survey data is 0.853, greater than 0.70, indicating that the questionnaire is suitable for factor analysis. Bartlett's sphericity test results showed that the approximate chi square value was 5589.936, which was large, and the significance probability was 0.000 (p<0.01). Therefore, the zero hypothesis of Bartlett sphericity test was rejected, and the scale was considered to be suitable for factor analysis, so the validity structure was good.

**Table 2** *KMO and Barlett's sphericity test*

Kaiser-Meyer-Olkin		0.853
	Approximate chi - square	5589.936
Barlett's sphericity test	df	276
	Sig.	0.000

The table3 adopts the principal component analysis method to extract factors with eigenvalues greater than 1. As a result, a total of 7 common factors are extracted, and the rotate the cumulative sum of squares is 71.592%, greater than 60%. After the varimax rotation, those 24 problem options be classified into 7 categories of factors, and the load of each item is higher than 0.5, indicating that the information contained in the extracted 7 factors is more comprehensive, and there is no case that the load of dual factors is high, and the observed variables are aggregated to each dimension according to the theoretical preset. In a word, the above analysis shows that the scale selected in this paper has good structural validity.

Table 3 *Factor rotation matrix composition*

Variable	Items	Elements						
		1	2	3	4	5	6	7
Effort Expectancy	EE1	0.056	**0.792**	0.191	0.123	0.049	0.162	0.134
	EE2	0.056	**0.787**	0.097	0.169	0.158	0.079	0.130
	EE3	0.014	**0.809**	0.130	0.129	0.176	0.064	0.152
Performance Expectancy	PE1	0.023	0.079	**0.882**	0.080	0.078	0.022	0.122
	PE2	0.055	0.181	**0.775**	0.143	0.091	0.077	0.154
	PE3	0.066	0.154	**0.786**	0.174	0.139	0.105	0.107
Social Influence	SI1	0.023	0.094	0.078	0.218	**0.735**	0.219	0.145
	SI2	0.031	0.248	0.117	0.127	**0.767**	0.049	0.088
	SI3	-0.025	0.059	0.113	0.041	**0.887**	0.059	0.132
Facilitating conditions	FC1	-0.005	0.083	0.103	0.142	0.125	**0.774**	0.103
	FC2	0.036	0.146	0.106	0.118	0.099	**0.796**	0.045
	FC3	0.040	0.052	-0.021	0.115	0.057	**0.828**	0.189
Willingness to learn	WL1	0.011	0.133	0.137	**0.830**	0.067	0.140	0.095
	WL2	-0.009	0.207	0.131	**0.746**	0.161	0.143	0.153
	WL3	0.045	0.099	0.140	**0.780**	0.150	0.137	0.177
Use behavior	UB1	0.154	0.167	0.139	0.143	0.126	0.201	**0.750**
	UB2	-0.024	0.301	0.209	0.105	0.233	0.157	**0.696**
	UB3	0.055	0.076	0.124	0.209	0.093	0.076	**0.873**
Information ecological imbalance	IEI1	**0.836**	0.037	0.047	0.000	0.043	-0.016	0.070
	IEI2	**0.814**	0.001	0.038	0.018	0.035	0.069	-0.040
	IEI3	**0.757**	-0.005	0.063	-0.137	-0.026	0.064	0.079
	IEI4	**0.880**	-0.033	0.014	0.058	0.021	-0.008	0.024
	IEI5	**0.806**	0.063	-0.008	0.099	0.007	0.035	-0.026
	IEI6	**0.781**	0.077	0.008	0.026	-0.041	-0.050	0.089
Eigenvalue		6.305	3.878	1.722	1.471	1.327	1.273	1.205
Variance devoting rates		16.734	9.491	9.403	9.134	9.058	9.035	8.736
Total variance explained		16.734	26.224	35.628	44.762	53.82	62.856	71.592

The ratio of general Chi - square to the degree of freedom should be greater than 1 and less than 3. When it is greater than 3, it means that the model adaptation is poor, and when it is less than 1, it means that the model adaptation is excessive. The X2 / DF in this paper is 2.275, which meets the judgment standard, indicating that the model fitting is good. GFI (goodness of fit index) is the fitness index, and AGFI (adjust goodness of fit index) is the adjusted fitness index. When the values of GFI and AGFI are both closer to 1, it indicates that the fitness of the model is higher. Generally, 0.8 is the standard, GFI in this paper is 0.922, AGFI is 0.898, which indicates that the fitness of this paper is higher. NFI (normalized fit index) is the benchmark adaptation index which is equal to 1 minus the preset model difference. The smaller the model difference is, the closer the value of NFI is to 1, the better the model adaptation is. Generally, the standard with NFI greater than 0.9 is adopted, and the NFI in this paper is 0.908, which conforms to the general standard. The TLI (Tucker Lewis index) is usually between 0 and 1. When the TLI is equal to 1, it indicates that the data fit the model completely. The general standard is 0.9, and the TLI in this paper is 0.935. CFI (comparative fit index) is a comparative fit index, with a value between 0 and 1. When CFI is equal to 1, it indicates that the data completely fits the model. The general standard is 0.9, and the CFI in this paper is 0.946, which is significantly higher than the standard. RMSEA refers to the residual mean square and square root which is the ratio of the overall difference to the degree of freedom, usually being less than 0.08. The RMSEA in this paper is 0.051. To sum up, all indicators of confirmatory factor analysis in this paper have reached the standard, and the overall fitting degree of the model is good. Furthermore, the path of the model is to be analyzed.
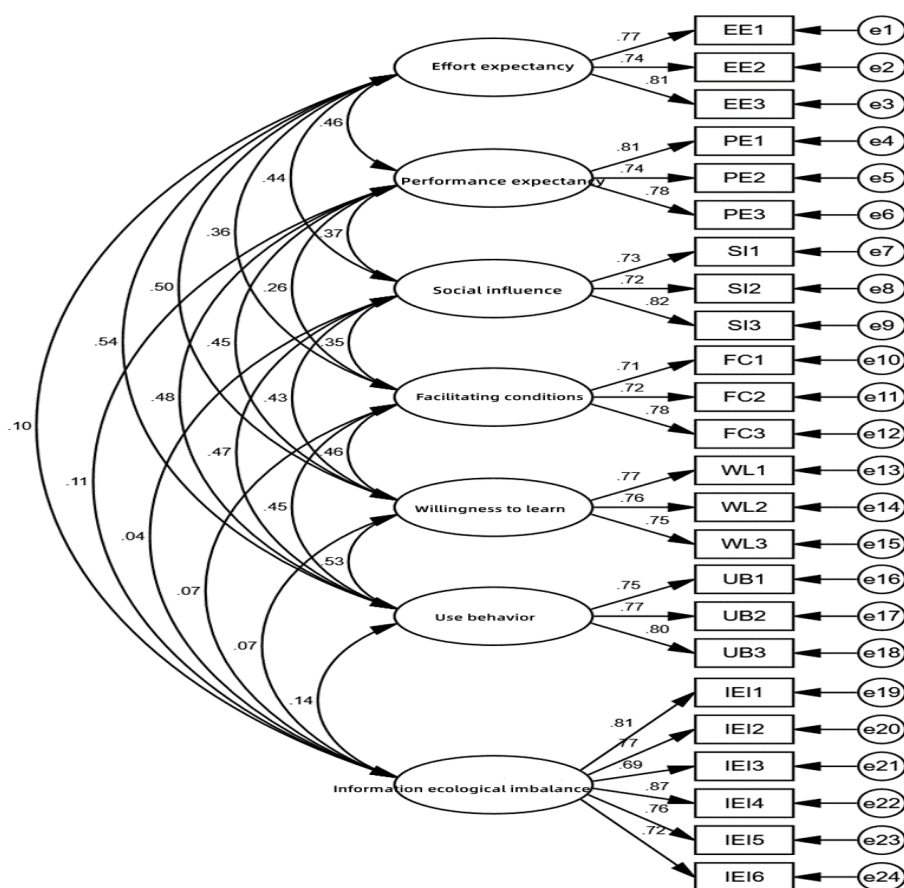
Figure 1 *Confirmatory factor model diagram (Standard)*

The fitting indicators of model operation are shown in the table, and they are: X ²/ Df=2.858, less than 3; GFI=0.931, AGFI=0.901, greater than 0.8, NFI=0.912, TLI=0.924, CFI=0.940, greater than 0.9; RMSEA=0.061, compared with the fitting standard of the table, the fitting indicators of the model meet the requirements, and the path of the model is to be analyzed.

Table 4 *The fitting indicator of structural equation model*

Indicator	X2/df	GFI	AGFI	NFI	TLI	CFI	RMSEA
Statistical data	2.858	0.931	0.901	0.912	0.924	0.940	0.061
Reference value	<3	>0.8	>0.8	>0.9	>0.9	>0.9	<0.08
Compliance	PASS	PASS	PASS	PASS	PASS	PASS	PASS

Referring to the path coefficient, C.R. value and P value in Figure 2, those seven core variables are tested for relationship hypothesis as follows:

1. Hypothesis testing of the relationship between effort expectancy and willingness to learn

The path coefficient of effort expectancy on willingness to learn is 0.235, the C.R. value is 3.785 with the corresponding significance to be P < 0.001. Therefore, there is a positive correlation between effort expectancy and willingness to learn which proves the hypothesis to be tenable.

2. Hypothesis testing of the relationship between performance expectancy and willingness to learn

The path coefficient of performance expectancy on willingness to learn is 0.216，the C.R. value is 3.784 with the corresponding significance to be P < 0.001. Therefore, there is a positive correlation between effort expectancy and willingness to learn which proves the hypothesis to be tenable.

3. Hypothesis testing of the relationship between social influence and willingness to learn

The path coefficient of social influence on willingness to learn is 0.160，the C.R. value is 2.752 with the corresponding significance to be P < 0.01. Therefore, there is a positive correlation between social influence and willingness to learn which proves the hypothesis to be tenable.

4. Hypothesis testing of the relationship between facilitating conditions and willingness to learn

The path coefficient of facilitating conditions on willingness to learn is 0.262，the C.R. value is 4.620 with the corresponding significance to be P < 0.001. Therefore, there is a positive correlation between facilitating conditions and willingness to learn which proves the hypothesis to be tenable.

5. Hypothesis testing of the relationship between effort expectancy and use behavior

The path coefficient of effort expectancy on use behavior is 0.226，the C.R. value is 3.711 with the corresponding significance to be P < 0.001. Therefore, there is a positive correlation between effort expectancy and use behavior which proves the hypothesis to be tenable.

6. Hypothesis testing of the relationship between performance expectancy and use behavior

The path coefficient of performance expectancy on use behavior is 0.192，the C.R. value is 3.430 with the corresponding significance to be P < 0.001. Therefore, there is a positive correlation between performance expectancy and use behavior which proves the hypothesis to be tenable.

7.   Hypothesis testing of the relationship between social influence and use behavior

The path coefficient of social influence on use behavior is 0.162，the C.R. value is 2.893 with the corresponding significance to be P < 0.01. Therefore, there is a positive correlation between performance expectancy and use behavior which proves the hypothesis to be tenable.

8.   Hypothesis testing of the relationship between facilitating conditions and use behavior

The path coefficient of facilitating conditions on use behavior is 0.184，the C.R. value is 3.288 with the corresponding significance to be P < 0.01. Therefore, there is a positive correlation between performance expectancy and use behavior which proves the hypothesis to be tenable.

9.   Hypothesis testing of the relationship between willingness to learn and use behavior

The path coefficient of willingness to learn on use behavior is 0.180，the C.R. value is 2.810 with the corresponding significance to be P < 0.01. Therefore, there is a positive correlation between performance expectancy and use behavior which proves the hypothesis to be tenable.
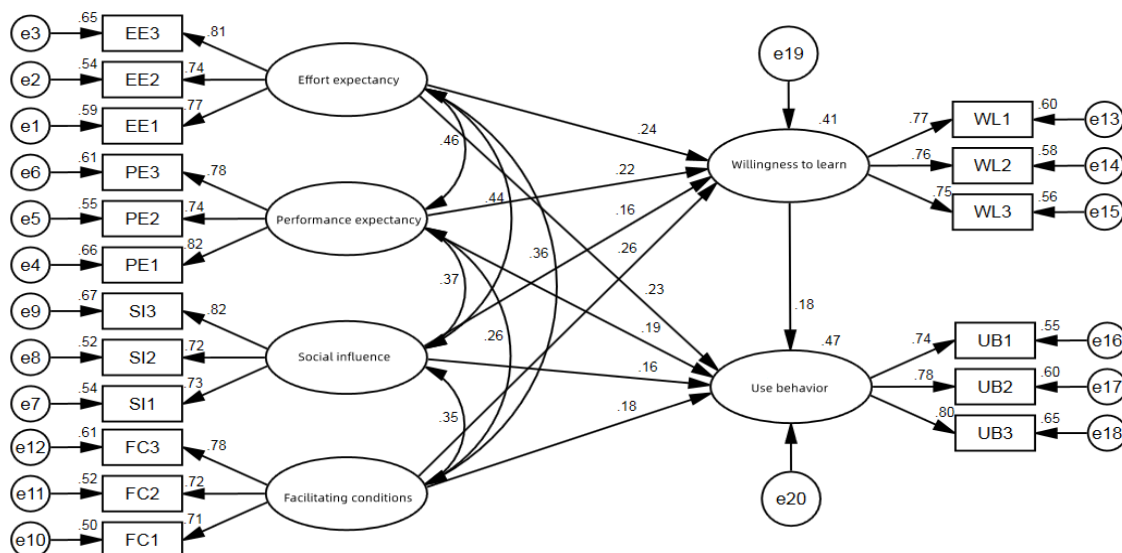
Figure 2 *Operation results of structural equation model diagram (Standardization)*

With reference to the effect value, confidence interval and P value in table 4-13, seven core variables are tested for mediating effect hypothesis, and the specific results are as follows:

1.   The mediating role of willingness to learn between effort expectancy and use behavior. The mediating effect of effort expectancy → willingness to learn → use behavior is 0.042 with 95% confidence interval to be [0.010,0.083](0 not included) which indicates that willingness to learn has a significant mediating effect between effort expectancy and use behavior of G2C elderly users, and the above results support the hypothesis;

2. The mediating role of willingness to learn between performance expectancy and use behavior. The mediating effect of performance expectancy → willingness to learn → use behavior is 0.039 with 95% confidence interval to be [0.011,0.070] (0 not included) which indicates that willingness to learn has a significant mediating effect between performance expectancy and use behavior of G2C elderly users, and the above results support the hypothesis;

3. The mediating role of willingness to learn between social influence and use behavior. The mediating effect of social influence → willingness to learn → use behavior is 0.029 with 95% confidence interval to be [0.007,0.058] (0 not included) which indicates that willingness to learn has a significant mediating effect between social influence and use behavior of G2C elderly users, and the above results support the hypothesis;

4. The mediating role of willingness to learn between effort expectancy and use behavior. The mediating effect of effort expectancy → willingness to learn → use behavior is 0.047 with 95% confidence interval to be [0.017,0.077](0 not included) which indicates that willingness to learn has a significant mediating effect between effort expectancy and use behavior of G2C elderly users, and the above results support the hypothesis;

Table 5 *Test results of intermediary effect*

Path hypothesis	Effect size	Lower	Upper	P
Indirect effect				
Effort expectancy-Willingness to learn-Use behavior	0.042	0.01	0.083	0.013
Performance expectancy- Willingness to learn - Use behavior	0.039	0.011	0.07	0.012
Social influence- Willingness to learn - Use behavior	0.029	0.007	0.058	0.034
Facilitating conditions - Facilitating conditions - Use behavior	0.047	0.017	0.077	0.012
Direct effect				
Effort expectancy - Use behavior	0.226	0.11	0.331	0.010
Performance expectancy - Use behavior	0.192	0.084	0.293	0.025
Social influence Use behavior	0.162	0.064	0.275	0.010
Facilitating conditions - Use behavior	0.184	0.109	0.29	0.010
Total effect				
Effort expectancy - Use behavior	0.269	0.15	0.355	0.010
Performance expectancy - Use behavior	0.231	0.13	0.323	0.011
Social influence - Use behavior	0.191	0.094	0.296	0.010
Facilitating conditions - Use behavior	0.231	0.149	0.323	0.010

The process function of SPSS21.0 is utilized to implement the simple slope test of the modulated effect to further verify the hypothesis proposed in this paper. The simple slope test formula is as follows:

Dependent variable=（β_1+β_3 * moderator variable）* independent variable+β_2* moderator variable +β_0

Three values are required in Process, namely Y variable, X variable, and Moderator variable W. According to the moderated mediator model and the simple slope test formula, Y variable = the Y value(synthesized value) of willingness to learn (Code: WLY); X variable = 4X value(synthesized value) of effort expectancy, performance expectancy, social influence and facilitating conditions (Code: EEx, PEx, six, FCX)；Moderator variable W = MV value(synthesized value) of information ecological imbalance (Code: IEIW). See Appendix 4 for specific SPSS data. The model selected by SPSS process is Model No.1 of "model templates for process for SPSS and SAS." in (Hayes, 2013). In addition, some variables are zero-centered in Process.

1.   The significance test results of the simple slope of EEx are listed in the table "conditional effects of the focal predictor at values of the moderator (s)". The relevant variables in this paper have been zero-centered, in which the medium regulation =0.000, the low regulation: IEIW = -5.305, effect= 0.311, p=0.000 < 0.001；High regulation: IEIW=5.305, Effect=0.573, p=0.000 < 0.001. According to the diagram of observed moderated effect, it is found that the slope of the two-line segments of low regulation and high regulation changes significantly. In the information ecology imbalance of high regulation, the positive effect of effort expectancy on willingness to learn is significant; While in the information ecological imbalance of low regulation, the positive effect of effort expectancy on willing to learn is significantly weak. Combined with the above results of multi-constituent and multilayer testing of moderating, the imbalance of information ecology has a positive moderated effect on the relationship between effort expectancy and willingness to learn, and the hypothesis proves to be tenable.

2.   The significance test results of the simple slope of PEx are not listed in the table "conditional effects of the focal predictor at values of the moderator (s)", which indicates that neither high regulation nor low regulation is significant. According to the diagram of observed moderated effect, it is found that the slope of the two-line segments of low regulation and high regulation doesn't change significantly. In the information ecology imbalance of high regulation, the positive effect of performance expectancy on willingness to learn is not significant; And in the information ecological imbalance of low regulation, the positive effect of performance expectancy on willing to learn is significantly weak. Combined with the above results of multi-constituent and multilayer testing of moderating, the imbalance of information ecology doesn't have a positive moderated effect on the relationship between performance expectancy and willingness to learn, and the hypothesis proves to be not tenable.

3.   The significance test results of the simple slope of SIx are listed in the table "conditional effects of the focal predictor at values of the moderator (s)". The relevant variables in this paper have been zero-centered, in which，the medium regulation =0.000, the low regulation:：IEIW = -5.305、Effect=0.229、P=0.000<0.001；High regulation：IEIW=5.305、Effect=0.514、P=0.000 <0.001。According to the diagram of observed moderated effect, it is found that the slope of the two-line segments of low regulation and high regulation changes significantly. In the information ecology imbalance of high regulation, the positive effect of social influence on willingness to learn is significant; While in the information ecological imbalance of low regulation, the positive effect of social influence on willing to learn

is significantly weak. Combined with the above results of multi-constituent and multilayer testing of moderating, the imbalance of information ecology has a positive moderated effect on the relationship between social influence and willingness to learn, and the hypothesis proves to be tenable.

4. The significance test results of the simple slope of PEx are not listed in the table "conditional effects of the focal predictor at values of the moderator (s)", which indicates that neither high regulation nor low regulation is significant. According to the diagram of observed moderated effect, it is found that the slope of the two-line segments of low regulation and high regulation doesn't change significantly. In the information ecology imbalance of high regulation, the positive effect of facilitating conditions on willingness to learn is not significant; Meanwhile, in the information ecological imbalance of low regulation, the positive effect of facilitating conditions on willing to learn is significantly weak. Combined with the above results of multi-constituent and multilayer testing of moderating, the imbalance of information ecology doesn't have a positive moderated effect on the relationship between facilitating conditions and willingness to learn, and the hypothesis proves to be not tenable.

Table 6 *Synthesized table of slope data*

Conditional effects of the focal predictor at values of the moderator(s)				
		IEIw	Effect	P
EEx	Low	-5.305	0.311	0.000
	High	5.305	0.573	0.000
PEx	Low	-	-	-
	High	-	-	-
SIx	Low	-5.305	0.229	0.000
	High	5.305	0.514	0.000
FCx	Low	-	-	-
	High	-	-	-
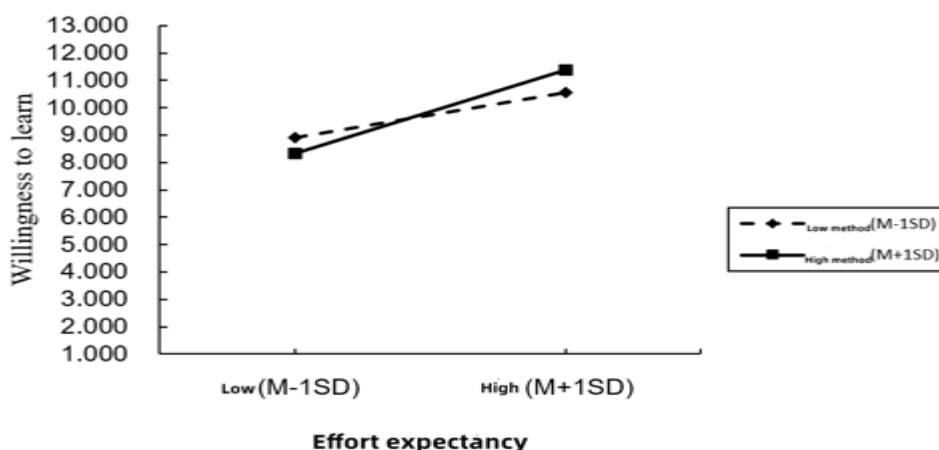
Figure 3 *High and low slope replot of effort expectation*
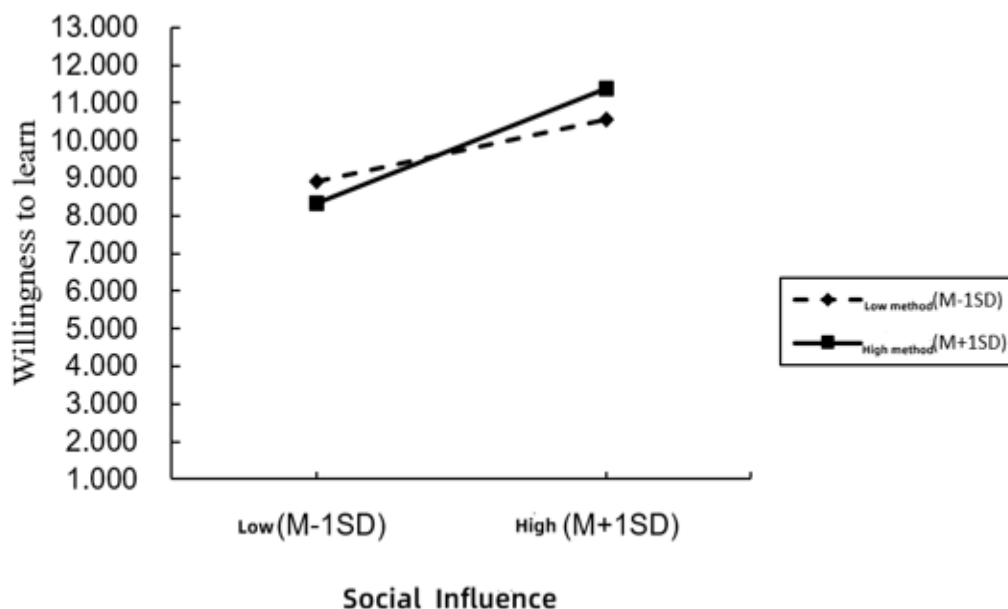
Figure 4 *High and low slope replot of social influence*

5. Discussion

There are many methods in the literature which are adopted to test moderated mediated models. The test process of this paper is to test independent variables against dependent variables first, by which it will explain whether the direct effect is significant and regulated. Besides, it will explain whether the model can be built, which is also the prerequisite of the paper. There are only two kinds of results: firstly, the direct effect is not significant, and the latter intermediary analysis belongs to generalized intermediary analysis, therefore, the results should be explained in detail. Secondly, the direct effect is regulated. According to the actual situation of this paper, the moderated mediator model is selected.

The research results show that under the normal distribution, the direct effect has a significant impact on willingness to learn and use behavior of G2C elderly users, which means that most elderly people are willing to actively participate in social activities. As a result, the public should not treat them with inherent thinking, but help and encourage them to use G2C. When willingness to learn is regarded as an intermediary variable, the corresponding indirect effects need to be further studied. Besides, the mediation effect test results in Chapter 4.4.1 show that willingness to learn has a significant impact on the use behavior of G2C elderly users which proved that it is feasible to take willingness to learn as the mediator of the model. Admittedly, there is a strong correlation between learning intention and use behavior. This paper attempts to take the imbalance of information ecology as a moderating variable and conduct a moderating mediator effect test. The results of Section 4.4.3 Moderated mediator test indicate that effort expectancy and social influence have a significant impact on willingness to learn; While performance expectancy and facilitating conditions have no significant impact on willingness to learn. To sum up, it can be inferred that the effort expectancy of the elderly users will fluctuate with the good or bad ecological information, and the social influence is to be more obvious at this time. This also shows that when national policies change, the elderly is easy to accept the information passed around, and then they will form a good positioning for their own requirements. In a word, the inferential conclusion is that the value of effort expectancy which adapts to the environment

is floating; At the same time, the results also suggest that government departments should take into account more factors that might affect when formulating public policies and facilities, such as: social forces have a great impact on people's choices; No matter how the environment changes, as long as the same purpose can be achieved, the performance expectancy is the same; So to speak, the policy is in line with the public. In addition, according to the analysis of controlled variables in chapter 4.4.2, the direct impacts of gender, whether to retire and education on use behavior are not significant.

Based on the above results, the analysis of the research hypothesis that held wrong in this paper can be carried out through the following points：

1.   The moderated mediator effect, Hypothesis H2d：Information ecological imbalance positively regulates the relationship between performance expectancy and willingness to learn. The testing of moderated effect and slope of information ecological imbalance indicates that such imbalance could not positively regulate the relationship between performance expectancy and willingness to learn. It shows that in the case of information ecology imbalance, the influence of performance expectancy on the elderly's willingness to learn can be ignored. On the contrary, with reference to the direct effects mentioned above, or without considering the variable of performance expectancy, the initiative of learning still lies in the hands of the elderly, so it can be inferred that under the imbalance of information ecology, the influence of the performance expectancy of the elderly on willingness to learn can be neglected.

2.   The moderated mediator effect, Hypothesis H4d：Information ecological imbalance positively regulates the relationship between facilitating conditions and willingness to learn. The testing of moderated effect and slope of information ecological imbalance indicates that such imbalance could not positively regulate the relationship between facilitating conditions and willingness to learn. It also shows a problem that regardless of the information ecology, the elderly have the willingness and behavior to buy and use mobile phones and other information equipment; Even if there are mandatory provisions of the national policy , they also have many choices, for example: Some government affairs must be registered online, and the elderly can first choose to register themselves, that is, learn how to operate; Besides, if the elderly do not want to learn or are not able to do it, they could find someone else to register instead. When the regulations stipulate that business can be handled on site, there may be no use for G2C at this time. That is to say, the facilitating conditions are useless. Therefore, it is speculated that the facilitating conditions have no effect on the willingness to learn in the case of information ecological imbalance. moderated mediator model.

Actually, the moderated mediator model can be divided into two categories: models that regulate only indirect impacts and models that regulate both indirect and direct impacts (Wen Zhonglin & ye Baojuan, 2014). The research model in this paper is to regulate the first half of the mediation process of moderator variables, that is, only to regulate indirect effects. Finally, multiple regression analysis is to be carried out after such regulating. The above process seems to have become the standard step of mediator effect analysis (Fang Jie, Wen Zhonglin, Liang Dongmei, & Li Ni, 2015). The development process of multi-layers moderating analysis method is a process of pursuing more accurate moderated effect estimates (Fang Jie, Wen Zhonglin, & Wu Yan, 2018). In the paper, the moderated mediator

effect has been implemented by ways of the multi-constituent and multilayer testing. Meanwhile, the Function of SPSS21.0 has been adopted to carry out the simple slope test of such mediator effect to verify the double test results again.

"In the moderated mediator model, are these test methods competitive or alternative?" in case B mentioned in the article, even after multiple-layer tests, there are still two tests that are not significant. The author explains that this is because the mediation effect is not regulated (wenzhonglin & ye Baojuan, 2014). Many studies have shown that in psychological and behavioral research, the moderating range of mediation effect is usually small, but the corresponding research is often meaningful (Ellis & Paul, 2010). The test methods verified by scholars are also verified in this paper. Although the above two test results and hypothesis are not tenable, they, coupled with the other two tenable hypothesis have the same reference value for future research.

6. Conclusion

The research results of this paper also show that even affected by the imbalance of information ecology, effort expectancy and social influence, the elderly can always maintain a positive willingness to learn to use G2C, and all the data are all statistically significant which is also closely related to Chinese traditional culture and current national policies. For example, Chinese traditional culture has Confucianism that attaches great importance to filial piety, and there is a traditional festival of respecting the elderly, "Double Ninth Festival", also known as "respecting the elderly", and Chinese education pays great attention to the cultivation and formation of family awareness, thus forming such a social atmosphere. Therefore, the choice of the elderly needs to be respected by the public which means that the public should help the elderly use information technology from two aspects. For researchers and regulation designers, it is necessary to fully consider the weakness of the poor learning ability of the elderly, create information technology products that meet the needs of the elderly and formulate many relevant regulations or laws suitable for the elderly. From the national level, the identification of social problems is the starting point of the process of public policy formulation and implementation. Any public policy is formulated to solve specific problems, and it is also a key link in the whole process of policy operation. The identification of social problems is not only a complex social interaction process, but also a complex cognitive process. At the same time, the problem of the elderly, who is a member of society, is also a matter of national concern. To understand the use behavior of the G2C elderly users is the basic task when formulating the policy related to G2C, thus raising the problems of G2C elderly users to be public policy issues.

It is tenable that most elderly people are well aware of the many benefits of information technology, but as they gradually age, their physical and mental state are declining, resulting in difficulties in learning and using information technology. The consequence is that these obstacles will make the elderly lose their self-confidence in using information technology education, resulting in the unwillingness of the elderly to use information technology (Wang Lin, 2010). For example, at the beginning of this paper, there is a survey on the elderly about learning G2C operation. The results showed that the elderly was very motivated to study and were willing to spend money and time to learn these new skills when conditions permitted. Although the elderly is a vulnerable group, they are also part of the society. The shortcomings of the elderly should not be treated with inherent thinking, but more patience and encouragement should be provided to help them overcome

these difficulties, so that they can better integrate into the information internet world and work with young people to establish an inclusive information technology era.

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