Promotion or Suppression: the Impact of Internet Use on Public Willingness to Participate in Garbage Classification Governance

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Abstract. Under the background of digital age, using Internet technology to guide the public to participate in garbage classification governance is the key to solving the garbage crisis. Based on CGSS2021 data, examined the use of the Internet on the public's willingness to participate in garbage classification governance. It is found that the Internet use and its access, frequency and ability all promote the public's willingness to participate in garbage classification governance. After the endogenous analysis and the robustness test, the conclusion is still valid. Accordingly, the use of the Internet should be enhanced by expanding Internet penetration and ease of use, carrying out training on Internet use, and strengthening the construction of Internet content to make full use of its promotion effect.

Keywords: garbage classification governance; Internet use; public participation

1 Introduction

The global waste crisis is seriously threatening the sustainable development of mankind. The growing global waste brings serious harm to ecological security and human health. In response to the crisis, countries have carried out waste classification governance to achieve "reduction, resource utilization, and harmless" of waste. As the world's largest waste producer, China attaches particular importance to waste classification governance. However, although this work has been going on for decades, its overall effectiveness still needs to be improved.

Public participation plays a key role in the garbage classification governance community, which not only reduces waste emissions and improves classification accuracy through voluntary actions and independent management, but also enhances the back-end governance efficiency of the government and the market, but also corrects government and market failures through supervision and negotiation. However, the lack of public participation constitutes a key shortcoming in the garbage classification governance, which also causes the continuous attention of academia and the government. Willingness is a prerequisite for behavior[1], and is often used as a surrogate indicator of behavior in studies involving environmental governance. Therefore, it is of great theoretical and practical significance to study how to enhance the public's willingness to participate in garbage classification governance, so as to promote public participation and overcome the governance bottleneck.

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2 Literature review and research hypothesis

2.1 Literature review

Most studies simply equate garbage classification behavior with the participation of garbage classification governance, and explore its influencing factors from three aspects of institutional causes, situational factors and psychological mechanism, but less based on the perspective of digital technology like Internet, limited research emphasis more on the use of the Internet access effect, less attention to the frequency and ability of the Internet. In terms of institutional causes, there are mainly two interpretation paths: The former focuses on demonstrating the effectiveness of formal systems such as legal norms[2] and education[3]. The latter mainly examines the effectiveness of informal institutions such as social capital[4], and trust[5]. In terms of situational factors, it mainly reveals that the participation of the public in garbage classification governance depends on the distance and classification identification of the classification facilities and other action situation. For psychological mechanism, other factors such like attitude, subjective norms and perceptual behavior control are explored with the help of theoretical frameworks of planning behavior theory[6].

The participation of garbage classification governance belongs to the participation of environmental governance, so the influence of environmental governance has important reference significance for this study. Related research is based on the digital technology —— governance participation framework, focusing on the double-edged effect of digital technology, there is always a debate about promotion or suppression. Promotion theory is based on media constructivism, arguing that Internet use enhances environmental risk perception[7], and knowledge[8], which positively promotes public to participate in environmental governance. Suppression theory is based on time-substitution hypothesis of Robert D. Putnam, believed that the use of the Internet squeezed out time for participation in environmental governance, which is likely to have a negative impact on public participation in environmental governance.

In conclusion, there is still room for expansion of existing studies. First, Most existing studies only focus on garbage sorting behavior, ignoring high-level participation in collaborative governance with other topics such as consultation and supervision. Second, the academic circle rarely explores based on the perspective of Internet use, and the limited research mostly emphasizes the effect of Internet access, and pays less attention to the frequency and ability of Internet use. Third, the debate between generalization theory and inhibition theory remains to be resolved.

2.2 Research hypothesis

Drawing on the study of the double-edged effect of Internet use on participation in environmental governance, this study believes that Internet use also has double-edged effects on the public's willingness to participate in garbage classification governance, so it puts forward the hypothesis of the theory of promotion and suppression theory. We mainly analyzes from three dimensions: environmental concern, environmental responsibility perception and environmental psychological control.

On the one hand, the use of the Internet may promote the public's willingness to participate in garbage classification governance by improving environmental care, environmental

responsibility and perceptual behavior control. First, studies have shown that environmental concern promotes participation in garbage classification governance[9]. The environmental pollution information transmitted by the Internet, can form a stronger visual impact, greatly induce the public's emotional resonance and crisis awareness, and further enhance environmental concern. Secondly, according to the value-belief-norm theory, the higher the perception of environmental responsibility, the more willing the public is to participate in garbage classification governance[10] The Internet can exert the function of public opinion guidance, thus affecting the expected pride and expected guilt of the public's participation in environmental governance, and thus strengthening their individual responsibility. Finally, according to the planned behavior theory, the stronger the perceived behavior control, the more willing the public is to participate in garbage classification and management[11]. The Internet has broadened the channels for participation in environmental governance, and enhanced its users' sense of participation in environmental governance. Therefore, the higher the level of Internet use, the lower the expected difficulty of participating in environmental governance, and the higher the belief in external control.

On the other hand, Internet use may also inhibit the public's willingness to participate in garbage classification governance by reducing environmental concern, environmental responsibility and perceptual behavior control. First, the concept of "consumerism" rapidly spread on the Internet easily makes the public keen to pursue personal consumption and material enjoyment, while ignoring the long-term environmental impact such as resource waste and waste increment, thus weakening the public's environmental concern. Secondly, a large number of negative news about environmental pollution disclosed on the Internet may induce the public herd mentality of public environmental pollution, making the public more inclined to blame environmental responsibility on external factors rather than on their personal responsibility. Again, there are a lot of environmental governance failure on the Internet negative news, may reduce the public political trust, these increase the worries of netizens about the external conditions of environmental governance, thus reduces the external perception behavior control.

With the increasing importance of environmental issues, under the positive guidance of the government, more professional environmental knowledge, more objective environmental pollution information, and more effective environmental discussion can be widely spread on the Internet, and the positive impact of Internet use on environmental concern is far greater than the negative impact, so this study tends to promotion theoretic hypothesis. As the main dimension of Internet use, the access, frequency and ability of it will also promote the public's willingness to participate in garbage classification governance. Based on the above analysis, the following hypothesis is proposed:

Promotion Hypothesis 1: Internet use promotes the public's willingness to participate in garbage classification governance.

Hypothesis 1.1: Internet use and access to promote the public's willingness to participate in garbage classification governance;

Hypothesis 1.2: The frequency of Internet use promotes the public's willingness to participate in garbage classification governance;

Hypothesis 1.3: The ability to use the Internet promotes the public's willingness to participate in garbage classification governance.

3 Research design

3.1 Data sources

The data of this study are from the 2021 China Comprehensive Social Survey ("CGSS2021"), which adopts a multi-stage stratified probability sampling design and is an authoritative micro-database commonly used in China. CGSS2021 is the latest published annual data of this database. In order to make full use of the sample information, this study removed the invalid samples with outliers, and used multiple interpolation method to fill the missing values, and finally formed a data set covering 19 provinces (municipalities directly under the Central Government, autonomous regions), 320 communities and 6322 samples.

3.2 Variable settings

3.2.1 Dependent variable

Drawing inspiration from Gong Wenjuan's research[12], construct the participation willingness scale of garbage classification governance, and use the factor analysis method for comprehensive measurement. The data showed that the Cronbach's α coefficient of the scale is 0.825, the KMO value is 0.834, and the Bartlett spherical test is less than 0.000, which has good reliability and validity and is suitable for factor analysis.

3.2.2 Core independent variables

Drawing lessons from Chen Yang's research[13]. In his study, Internet use was evaluated from the three dimensions, access, frequency and ability, and its comprehensive level was obtained through the entropy weight method.

3.2.3 Controlled variable

Learn from Jia Yajuan's research[14], individual characteristics and situational factors such as age, sex, education level, income, infrastructure, government environmental performance, and regional variables were included as controlled variables.

The above variable settings and descriptive statistics are shown in **Table 1**.

Table 1. Variable settings and descriptive statistics.

class	Variable (N=6322)	Variable definition	mean	standard deviation	crest value
dependent variable	willingness to participate in garbage classification governance	Factor analysis obtains the public willingness to participate in garbage classification governance	0.005	0.992	3.543
Core independent	Internet access	Yes =1, No =0	0.711	0.454	1

variable	frequency of Internet use	Very infrequent =1, less frequent =2, not necessarily =3, more frequent =4, very frequent =5	3.581	1.795	1
	Internet usage ability	Very infrequent =1, less frequent =2, not necessarily =3, more frequent =4, very frequent =5	2.126	1.194	5
	Internet use	The entropy weight method obtains the comprehensive level of Internet use	0.488	0.311	1
	age	Age / year of the respondents	51.978	16.799	99
	sex	0= female, and 1= male	0.463	0.499	1
	education level	Not received any =1, primary school =2, middle school =3, university =4, graduate student or above =5	2.786	0.913	5
	income	Annual personal income / 10,000 in 2020	12.184	54.478	1000
	urban and rural	City =1, village =0	0.41	0.492	1
controlled variable	infrastructure	Yes =1, No =0	0.919	0.274	1
	government environmental performance	One-sided attention to economic development, ignoring environmental protection work=1, not enough attention, insufficient environmental protection investment=2, although efforts have been made, but the effect is not good =3, into a great effort, have certain results=4, achieved great achievements =5	3.682	0.996	5
	eastern region	Yes =1, No =0	0.423	0.494	1
	western region	Yes =1, No =0	0.279	0.448	1

3.3 Empirical model setting

As shown in Equation (1), a model of factors influencing the public willingness to participate in garbage classification governance is constructed, and the influence effect of Internet use and its various dimensions on the public willingness to participate in garbage classification governance is analyzed. Among them, *y* is the public's willingness to participate in garbage classification governance; $Internet_i$ refers to Internet use and its dimensions, i=1,2,3,4 representing "Internet use", "Internet access", "Frequency of Internet use" and "Internet usage ability" respectively; *Control* are controlled variables; β_i and χ_i were the core independent variable and the control variable, respectively; α_i for the intercept term, ε_i is given as the random error term.

$$y = \alpha_i + \beta_i Internet_i + \chi_i Control + \varepsilon_i \quad (1)$$

4 Empirical results analysis

4.1 Analysis of the effect of Internet use

Empirical results are shown in **Table 2**. In Model 1, the coefficient of Internet use was 0.473 and significant at the 1% significance level, which meant that for each unit increase in Internet use, the willingness to participate in garbage classification governance will increase by 0.473 units, indicating that Internet use will promote the public's willingness to participate in garbage classification governance, verifying the hypothesis 1. In Model 2, the regression coefficient of Internet access is 0.136 and significant at the 10% significance level, which means that one unit of Internet access increases the willingness to participate in garbage classification governance by 0.136 units, indicating that Internet access will promote the public willingness to participate in garbage classification governance, verifying the hypothesis 1.1. In model 3, the regression coefficient of Internet use frequency was 0.038 and significant at the 5% significance level, which means that for every 1 unit increase of Internet use frequency, the willingness to participate in garbage classification governance will increase by 0.038 units, indicating that the frequency of Internet use will promote the public willingness to participate in garbage classification governance, which verified the hypothesis 1.2. In model 4, the regression coefficient of Internet use ability is 0.115 and significant at the 1% significance level, which means that the willingness to participate in garbage classification governance will increase by 0.115 units, indicating that the Internet use ability will promote the public willingness to participate in garbage classification governance, which verifies the hypothesis 1.3. In terms of controlled variables, education level, infrastructure and government environmental performance also have a significant positive impact on the willingness to participate in garbage classification governance.

Table 2. Regression Results

explanatory variable	Model 1	Model 2	Model 3	Model 4
Internet use	0.473***			
	(0.106)			
Internet access		0.136*		
		(0.068)		
frequency of Internet use			0.038**	
			(0.017)	
Internet usage capability				0.115***
				(0.021)
income	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
urban and rural	-0.050	-0.023	-0.024	-0.048
	(0.053)	(0.051)	(0.052)	(0.053)
sex	0.040	0.044	0.043	0.031
	(0.030)	(0.031)	(0.030)	(0.030)
age	0.004**	0.002	0.002	0.002
	(0.002)	(0.002)	(0.002)	(0.002)
education level	0.101***	0.141***	0.139***	0.095***
	(0.034)	(0.032)	(0.032)	(0.032)
infrastructure	0.225***	0.227***	0.229***	0.232***
	(0.081)	(0.082)	(0.082)	(0.080)

Government environmental performance	0.133***	0.135***	0.134***	0.129***
	(0.027)	(0.027)	(0.027)	(0.027)
eastern region	0.012	0.022	0.020	0.016
	(0.040)	(0.040)	(0.040)	(0.039)
western region	0.031	0.028	0.033	0.025
	(0.043)	(0.044)	(0.043)	(0.043)
nodal increment	-1.418***	-1.319***	-1.363***	-1.271***
	(0.200)	(0.209)	(0.213)	(0.197)
Sample size	6322	6322	6322	6322

Note: *, * * and * * * are significant at the level of 10%, 5% and 1% respectively, the same below.

4.2 Endogeneity analysis and robustness test

4.2.1 Endurance analysis

In order to deal with the endogenous problems caused by missing variables and reverse causation, this study minimized the omission of key variables and used the instrumental variable method to reduce the estimation bias. Using the average Internet use in the individual's community as an instrumental variable included' community Internet use as an instrumental variable. "Community Internet use" will not have a direct impact on personal garbage sorting governance to participate, but the Internet use behavior has the same group effect, the use of the Internet by people around will affect the tendency and behavior of individuals to use the Internet, namely the tool variables will not affect the disturbance, meet the tool variable selection of exogenous and relevance requirements.

The results are shown in **Table 3**. The F value of the first stage was 271.247, which is much greater than the critical value of 16.38 under the 10% bias, indicating that the tool variable of "community Internet use" has a significant impact on the public's willingness to participate in garbage classification governance. In the second stage, after this instrumental variable is used to eliminate the endogeneity, the influence of Internet use on the public's willingness to participate in garbage classification governance still exists, and it was significant at the 5% level, indicating that the results were still robust after correcting the possible endogenous bias problem.

Table 3. Endogenicity analysis

explanatory variable	stage I	stage II
	Internet use	Willingness to participate in garbage classification governance
instrumental variable	0.379***	
	(0.023)	
Internet use		0.610**
		(0.274)
controlled variable	Controlled	Controlled
F value	271.247	—
sample size	6322	6322
adjusted R-square	0.525	0.048

4.2.2 Robustness test

Robustness was tested using the independent variable versus the dependent variable replacement method. First, the factor analysis method was used to obtain the comprehensive level of Internet use, replacing the original explanatory variables. The results are shown in **Table 4**,where Internet use remains significant at the 1% level and with a positive coefficient, and hypothesis 1 still holds. Secondly, the entropy weight method was used to obtain the comprehensive level of participation willingness of garbage classification governance, and replace the original explained variables. The results showed that the regression coefficient of Internet use was 0.957, which was still significant at the 1% level. This indicates that the results are still robust after replacing the explained variables and the explained variables.

Table 4. The robustness test

explanatory variable	Replace explanatory variable	Replace the explained variable
Internet use	0.122***	0.957***
	(0.033)	(0.003)
controlled variable	Controlled	Controlled
sample size	6322	6322

5 Conclusion and discussion

Based on CGSS2021 data, we found that the use of the Internet and its access, frequency and ability all promote the public's willingness to participate in garbage classification governance. After endogenous analysis and robustness test, the conclusion of promoting effect is still established. According to this conclusion, we should comprehensively improve the public use of the Internet from the aspects of access, frequency and ability, and make full use of its promoting effect. So the following enlightenment is obtained:

First, break down barriers to Internet use, and ensure that the public can use the Internet smoothly and effectively. To achieve this, government departments should further improve the Internet infrastructure, reduce Internet costs, and improve the speed of Internet use to improve the accessibility and convenience of Internet use. The government and all sectors of society should actively carry out public welfare training and services on the use of the Internet to cultivate the public's ability to use the Internet. In addition, individual citizens should also actively adapt to the development and changes of the digital society, actively learn various Internet use skills and methods, and improve their Internet-use frequency and ability.

Second, strengthen the construction of Internet content, through the Internet to publish garbage classifieds, environmental information, environmental protection videos, etc., to increase the public's environmental concern, responsibility, perceived behavior control, and enhance the ability and willingness to participate in environmental governance.

Last but not least, when using the Internet to carry out environmental governance work, it should also prevent and control potential risks such as information distortion, network infringement, and Internet addiction. Therefore, the government and relevant departments should do a better job in the control of environmental information, improve the relevant legal system, ensure the accuracy and authenticity of network information, and guide the public's garbage treatment

behavior. Establish network security defense line to avoid disclosure of personal privacy in the process of supervision and governance; Uphold the principle of moderation and avoid the drawbacks brought about by excessive Internet access.

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