Users' Behavior on Public Welfare is Changing in Internet

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Abstract

It's a new form of public welfare using Internet platform, which can mobilize more people to participate in public welfare and the power of it can't be ignored. Meanwhile, how to use public welfare platform to influence more people and encourage them to participate in it is worth studying. Drawing on activity theory, we take the whole process of Internet public welfare as an activity, and analyze how Internet public welfare platform affects users' behavior change through questionnaire. The results shows that the reputation, enjoyment, social value and perceived social support have positive effects on self-efficacy on platform, enjoyment and social value have significant impact on self-efficacy on public welfare. Besides, self-efficacy on platform and public welfare affects intention, the intention and self-efficacy have significant effects on behavior change both in platform and public welfare. This paper provides theoretical suggestions on how to build an Internet public welfare platform and lays a theoretical foundation for how to influence users to participate in public welfare activities.

Keywords

Internet public welfare, user behavior change, activity theory.

1. Introduction

In the process of economy and technology development, people's conscious of public welfare and protection is gradually awaken. It is obvious that public welfare organizations are playing an important role in social assistance, environmental protection and other aspects. To encourage more people to participate in public welfare, although they make efforts in image change[1] or organization performance[2], they can't ignore the truth that the development of Internet has gained popularity. More people select public welfare online rather than offline because of the convenience and the fast of the Internet[3]. The common use of Internet asks public welfare organizations to make changes in internet-based platform design, and they have to consider how to better operate it to influence more people to join in public welfare and change their behavior.

Users' acceptance of an application, or participation in an activity, even the behavioral or conscious change is often influenced by various factors. So when considering platform architecting, the design often needs to considering users' habits of using mobile phones to meet their life demands. For example, Elferbein et. al try to use purchase incentives to encourage people make donations[4]. Good results also showed in practices that combination of green technology and information technology can lower carbon dioxide[5]. In recent years, relevant public welfare organizations have benefit from Internet platforms by using websites[6], online social media[7], and applications or program embedded in relevant applications.

Among many Internet public welfare platforms, AntForest is an application for environmental protection and tree planting. Users can collect energy to plant a virtual tree. When the virtual tree grows up, they can adopt a real tree in the name of themselves and plant it in the desert

to realize the goal of environmental protection. Energy can be produced through daily consumption, daily walking. If friends have energy, they can also steal it from each other. In order to encourage users to produce more energy, the platform also makes energy rank of friends.

Fig.1 virtual tree in AntForest   **Fig.2** Real tree showed in AntForest

Internet public welfare platform is not only similar to public welfare organizations, but also bears the nature of traditional Internet platforms. Therefore, when considering the construction of Internet public welfare platform, on the one hand, the general characteristics of Internet platform should be considered, on the other hand, the feature of public welfare should also be considered, thus it can effectively make influence and changing users' public welfare behaviors. Since internet public welfare is a complicated activity, it is very appropriate to use the activity theory to analyze the whole activity. Activity theory focuses on the behavioral or conscious change of participants during the whole activity. When the theory is used, influencing factors related to the participants will be showed, which will lay foundation to analyze the mechanism of users' behavior change.

The main purpose of this paper is to explore how the Internet public welfare platform affects the change of users' behavior on public welfare. In order to study the mechanism of behavior change, firstly we explores the behavior change structure based on activity theory, then user behavior change model in Internet public welfare platform will be constructed. Finally, a questionnaire survey will be used to verify the hypotheses of the model.

2. Literature Review

2.1. Activity Theory (AT)

Activity theory (AT) was first proposed in psychology by Vogotsky[8], which mainly studies the change of conscious or behavior when people participant in human activities. The theory was further perfected and developed into a mature model by Leont'ev[9] and Engestrom[10]. In the whole activity, there are six main basic concepts(Fig.3), the first type is three main elements include subject, object and community. AT tries to study behavioral or conscious change of subject in an activity, the change is gradually formed by subject's repetitive action on object and subject's interaction with community, the required results of activity will be obtained in this process. The second type is three mediations, which are instrument, rules and division of labor. Instrument is the tool that subject uses to act on objects, and the rule is made to achieve the goal of activity, the division of labor explains how subject and community distribute their work on objects. There will be contradictions in the activity among the elements, and it is because of these contradictions that activities continue to evolve into new activities, which we can view as a new stage.

Since AT was proposed, it has received much attention in many fields. In education, scholars try to study learners' learning behaviors and use it to influence their habits[11].For example, Chung et al studied users' learning process using mobile phones in the framework of AT[12]. There are also some usage research on knowledge sharing area. Kelly et al. studied the evolution of knowledge[13] and Simeonova et.al studied knowledge sharing process in web

2.0. [14]. In recent years, some scholars try to explore AT's usage in the field of information system, literature summary of AT has made to summarize prediction for information system development [15-17]. The main research is used in human-computer-interaction design, which will brings comfortable interactive experience to users. Kaptelinin and his team made opinions on AT and thought that the change of users' behavior occurs when computer involves as instrument in an activity[18]. Meanwhile, AT in human-computer interaction design makes theoretical and technological requirements for designers[19].
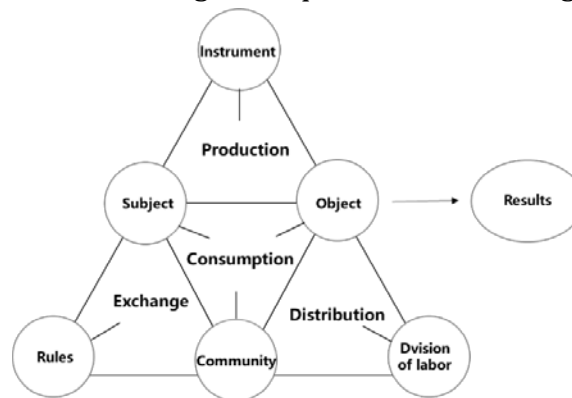
Fig.3 Activity theory framework

Since the framework of AT is complex, there are diverse ways of AT adoption in researches. For example, Yoon et al. used the whole framework of AT in accident analysis to analyze environmental factors[20]. Gleasure et al. used the AT revolution concepts to analyze how resource is allocated in crowdfunding[21]. However, in Internet public welfare, since the participation of activities is not only related to the Internet platform, but also to the overall environment in which users participate. We use the element and their interactive influence of AT to make analysis.

2.2.   Behavior Change

User's behavior change can be influenced effectively by electronic instruments. The wearable equipment combined persuasive technology in fitness showed good results for users' behavior change[22], it is well used to help obesity users to control their behavior by measuring their weights[23]. Hsu et al. found that application interface will finally influence user's application using habits and their preference for mobile choice[24]. Robert and others find that design of electronic books can attract students and affect their learning behavior change[25].

Unlike behavior change, the behavior change in public welfare embodies the way of thinking, which is beneficial for the development of society and the environment. The behavior change is the combination of behavior change in sustainable behavior and good behavior for charity. Sustainable behavior refers to environmental and friendly behavior in life like green consuming or green walking, such behavior is not influenced by others but their willingness[26]. Traditionally, sustainable behavior can be influenced easily, religion is usually a critical factor for the change[27], and daily descriptive norms takes important part[28], and even the necessary award will prompt sustainable behavior. Rob Gleasure et al. thinks that the feasibility of the goal has effects on personal intention for donation[29], and it will influence their donation behavior. Sometimes, Injunctive Norm and past personal habits can't be ignored in behavior change[30].

In general, the technology can affect users' attitude towards the platform effectively [7], which will further influence users' behaviors. At present, the research on Internet public welfare and use of AT is deficient. In addition, the influence of Internet public welfare platform on users' behaviors is worth studying. Internet public welfare involves many factors such as Internet

platform, participating users and social environment. The study of complex systems from the perspective of AT will be conducive to analyze user's position in Internet public welfare as well as the key factors for the change of users' public welfare behavior.

3. Research Model and Hypothesis

3.1. Analysis of AntForest based on AT Theory

In order to understand user's behavior change model, we analyze the framework of AntForest platform based on AT, and draw the structure as shown in figure4. In the Internet public welfare, the user is often the subject, and the object that causes the user behavior to change is the virtual tree. Two main elements that affect users' actions on objects are tools and community. In this case, tools are Internet public welfare platform, and community is user's friends and people interact with users in AntForest. So factors in tools and community play an important part in user's behavior change in Internet public welfare, and the following model will be constructed based on this.
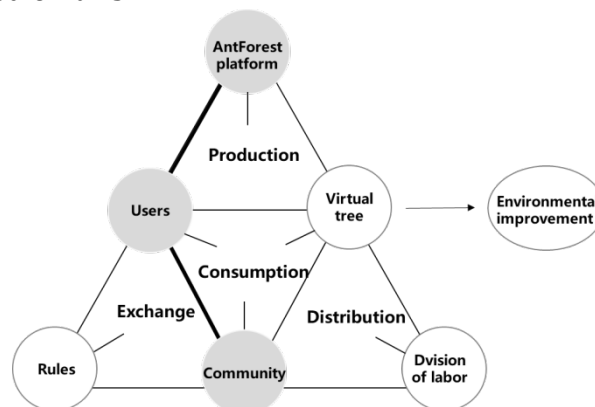

Fig.4 AntForest in AT

3.2. Hypothesis

Two main systems involved with users are the production system and the consumption system, while the participation of the community and the role of intermediary tools are the main factors that promote users to produce energy and plant virtual trees. So we just select variables in instrument and community that affect users directly. After managing materials and reviews, the chosen variables and constructed model are shown in figure 5.
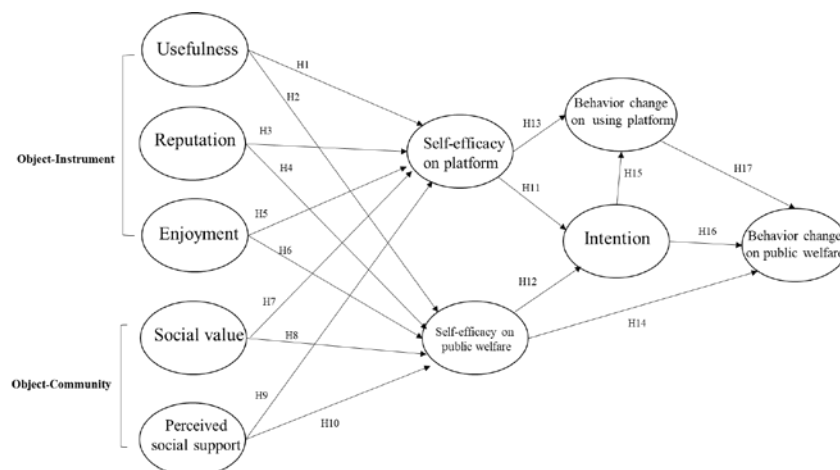

Fig.5 Research model

(1)Usefulness, Reputation, Enjoyment

Usefulness is considered when the system is helpful to user's task complementation, sometimes, whether the system helps user to achieve goals can be shown by usefulness[31]. Enjoyment refers to the entertainment experience in the use of system[32], the feeling is hedonic value of a system[33]. Users don't want to make fuss in platform selection, the reputation of platform will provide good advice for them. Reputation always denotes platform's image and performance, and their attitude is easily influenced by reputation[34].

In our daily life, people always don't know what they want to do, at the same time, they want to increase their knowledge in sustainability and do something for it[35]. It means that system should give them enough time and help them to achieve the goal. When people depend on platform, usefulness, enjoyment and reputation will be helpful for user's selection. Hence, hypotheses are:

H1: Usefulness positively influences self-efficacy on platform

H2: Usefulness positively influences self-efficacy on public welfare

H3: Reputation positively influences self-efficacy on platform

H4: Reputation positively influences self-efficacy on public welfare

H5: Enjoyment positively influences self-efficacy on platform

H6: Enjoyment positively influences self-efficacy on public welfare

(2)Social value, perceived social support

Influencing factors of community for users include social value and perceived social support. Social value always shows obtained value in society from an enterprise's image[36]. In real life, individual social life is reflected in mutual learning in surrounded people[37], or intrinsic pleasant for well public performance[24]. User's perceived social support is the sense of belonging and identity for their social network[38]. Social support often makes individuals use the platform freely and without pressure[39].

Users in AntForest always play with their friends, and the continuing interaction with friends always motivates them to adopt the platform. Presentation for collected energy rank is always concerned by people, it prompt their repeat behavior for energy collecting. The interaction and rank gives them a way of contacting with friends in life and doesn't spare them much unnecessary time. Therefore, we propose following assumptions:

H7: Social value positively influence self-efficacy on platform

H8: Social value positively influence self-efficacy on public welfare

H9: Perceived social support positively influence self-efficacy on platform

H10: Perceived social support positively influence self-efficacy on public welfare

(3) Self-efficacy on platform and public welfare

Bandura pointed that self-efficacy is an individual's ability to achieve the goal or a task, the ability is often judged by users themselves[40]. Sometimes, a user can continue using the application but doesn't do anything on public welfare. Since user's ability in using platform and public welfare are different, two kinds of self-efficacy is considered. The first kind is self-efficacy on platform, which means that a user thinks that he has the ability or time to use the platform. The other is self-efficacy on public welfare, it is explained that whether a user might put into action immediately in public welfare.

The possibility that the goal can be achieved or not usually influence user's intention to use the platform[41]. Users of AntForest tend to use the platform because they have time and energy to do public welfare, and they can make their evaluations for using platform[42]. Therefore, the following hypotheses are put forward:

H11: Self-efficacy on platform has positive influence on intention

H12: Self-efficacy on public welfare has positive influence on intention

(4)Intention and Behavior change

A person always engages in tasks they are sure of , because the results can bring them confidence, and they are willing to act on it, the behavior will change easily[43]. The behavior change of users in public welfare refers to the substantial change of users' personal and consciousness after they leave the platform. The behavior change of users on the platform refers to the change of users' habits in using the platform. If users in AntForest have intention to use the platform, they will learn to use it initiatively, as time goes by, the behavior of platform usage changes. Through the guidance of the platform, users will gradually develop the awareness of environmental protection and public welfare. To complete the task of platform, users will do public welfare in life, the conscious and behavior in public welfare will change in this process. So self-efficacy on platform and intention can influence user's behavior change[30]. Hence, the hypotheses are established:

H13: Self-efficacy on platform positively influences behavior change on platform

H14: Self-efficacy on public welfare positively influences behavior change on public welfare

H15: Intention positively influences behavior change on platform

H16: Intention positively influences behavior change on public welfare

H17: Behavior change on platform positively influence behavior change on public welfare

4. Methodology

4.1. Measurement

The model of behavior change is constructed base on AT, and influencing variables for user's behavior change in public welfare is reflected in community and instruments. Variables in instruments (AntForest platform) and community (community in AntForest) was selected with rigorous thinking of actual situation and literature. Since the object of the survey is the AntForest users, part of the questions are modified in combination with the characteristics of AntForest, so as to ensure that users understand easily. The 7-point likert scale is adopted in the design, following table shows the items:

4.2. Sampling and Data Collection

The questionnaires were distributed in network, social media. We just make research on users in AntForest in anonymous way. 410 users participate in the online survey and 329 valid questionnaires are obtained with recovery rate of 80.24%, Sample demographic is depicted in table2.

Table 1. Measurement items

Usefulness(US)	Perceived social support(PSS)
Using the Antforest improves my productivity in environmental	I can grow trees with my friends in AntForest
I find the Antforest to be useful in my learning environmental	I have friends from whom I can get green energy
AntForest has provided basic functionality to show love as a	We are willing to get energy from each other in AntForest
Reputation(RE)	My friends are willing to help me collecting green energy in
AntForest is recognized by well-known, reputable third parties	**Self-efficacy on platofrm(SOP)**
I believe that the third-party recognition for AntForest is	I would be able to use AntForest well for protect
The third-party recognition listed on AntForest shows AntForest	I think that I have the resources, knowledge, and ability to
Enjoyment(EN)	Using AntForest was entirely within my control
Using AntForest provides me with a lot of enjoyment	**Self-efficacy on public welfare(SOEP)**
Using AntForest gives me pleasure	I could implement my low carbon behavior through
The AntForest is creative	I am confident that green travel will be performed in my life.
The paltform of AntForets displays visually pleasing design	I feel confident that green consumption will be performed in
The AntForets is visually appealing	I am confident that I can master AntForest and live a low-
Social value(SV)	**Intention(IN)**
The fact I use platform makes a good impression on other	I intend to continue using AntForest rather than discontinue
Using AntForest brings me social approval	If I could, I would like to continue using AntForest as much
Using AntForest helps me feel accepted	I will strongly recommend others to purchase paid apps
Using the AntForest enables me to acquire more information or	**Behavior change on pulic welfare(BCPW)**
Behavior change on using platform(BCUP)	Since my enrollment, I have developed a daily routine to use
I use AntForest as a matter of habit	Since using AntForest, my daily life has become greener and
I use AntForest without thinking	Whenever there is a chance, I take an action that can
Using AntForest is natural to me	Since using AntForest , I pay more attention to save

Table 2. Descriptive statistics

Variable	Item	Number	Ratio
Sex	Male	156	47.42%
	Female	173	52.58%
Age	<18	4	1.22%
	18-25	222	67.48%
	26-30	79	24.01%
	31- 40	15	4.56%
	41- 50	9	2.74%
Education	High school/ Less than high school	8	2.43%
	Some college but no degree	21	6.38%
	Bachelor degree	123	37.39%
	Master degree	166	50.46%
	Doctorate degree	11	3.34%

5. Data Analysis

5.1. Reliability and Validity

We use Amos for data analysis, and make confirmatory factor analysis. The results showed that Conronbach's α and CR are both greater than 0.8, and AVE are all above 0.63, indicating

that each variable has good reliability and the questionnaire was designed reasonably. In order to check the discriminant validity, SmartPLS is used to measure the correlation coefficient between each variable, it is showed that square root of AVE was greater than the corresponding correlation coefficient. At the same time, the factor loading of each variable were all greater than 0.7. Thus, this measurement shows a high degree of reliability and convergent as well as discriminant validity.

Table 3. Reliability and validity

	Item loading	Alpha	CR	AVE	BCPW	BCUP	EN	IN	PSS	RE	SOEP	SOP	SV	US
BCPW	0.86-0.91	0.93	0.93	0.78	*0.91*									
BCUP	0.83-0.89	0.89	0.89	0.74	0.78	*0.91*								
EN	0.75-0.88	0.91	0.92	0.69	0.78	0.78	*0.86*							
IN	0.79-0.91	0.88	0.88	0.72	0.85	0.78	0.82	*0.90*						
PSS	0.83-0.85	0.91	0.91	0.71	0.74	0.76	0.74	0.74	*0.89*					
RE	0.78-0.86	0.86	0.86	0.67	0.65	0.61	0.71	0.70	0.58	*0.88*				
SOEP	0.84-090	0.93	0.93	0.77	0.78	0.73	0.72	0.75	0.77	0.64	*0.91*			
SOP	0.75-0.83	0.85	0.84	0.63	0.73	0.81	0.73	0.71	0.79	0.57	0.75	*0.88*		
SV	0.83-0.93	0.94	0.94	0.80	0.70	0.66	0.55	0.58	0.63	0.42	0.61	0.74	*0.92*	
US	0.78-0.88	0.87	0.87	0.70	0.72	0.66	0.76	0.74	0.65	0.77	0.68	0.64	0.49	*0.90*

Notes: Diagonal elements are square roots of AVE

5.2. Results

The measurement model of good-of-fit is tested. Chi-square/degrees of freedom (χ^2/df) is 2.89 (< 3), comparative fit index (CFI) is 0.912 (>0.9), and Root Mean Square Error of Approximation (RMSEA) is 0.076(<0.08). All this indicates good fit of model constructs.
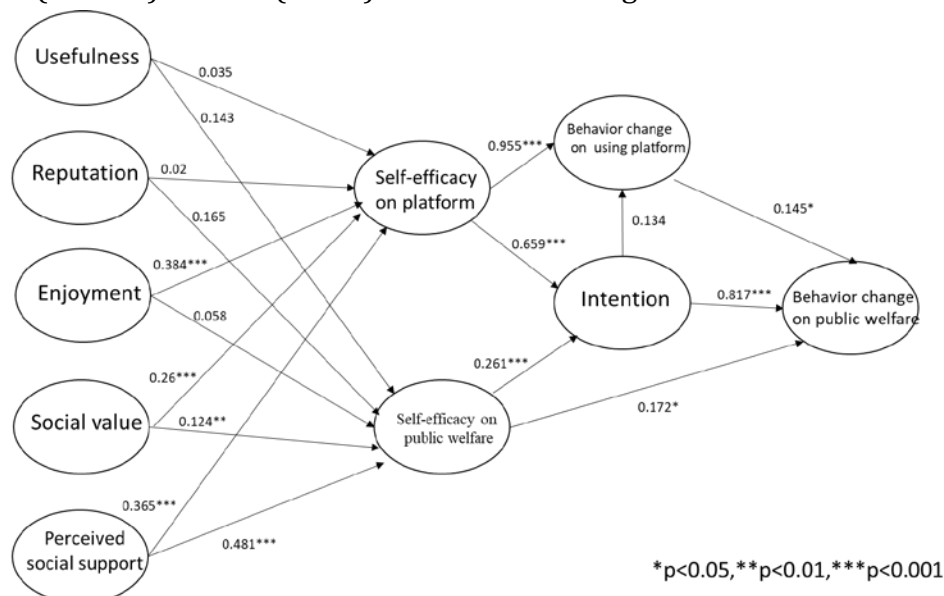
Fig. 6 Structural path analysis results

To test our hypotheses, we make measurements and the result is shown in figure 6. As is seen in the picture, hypotheses that usefulness and reputation affect self-efficacy both on platform and public welfare are not well supported, so H1, H2, H3 and H4 are not verified. Self-efficacy on platform is predicted by enjoyment (β = 0.384), social value (β = 0.26) and perceived social support (β = 0.365). Self-efficacy on public welfare is only influenced by social value

(β = 0.124) and perceived social support (β = 0.481). Therefore, H5, H7, H8, H9, H10 are supported. The result indicates that people usually spend more time on entertainment and their social network, due to this, they tend to use platforms that most of their friends use.

The intention is determined by self-efficacy on platform (β = 0.659) and public welfare (β = 0.241). So H11 and H12 are well supported. Self-efficacy on platform (β = 0.955) has significant influence on behavior change on using platform, but intention doesn't. So H13 is supported but H15 is not. Behavior change is determined by behavior change on using platform(β = 0.145), intention(β = 0.871) as well as self-efficacy on public welfare(β = 0.172), so H14, H16 and H17 are well accepted. We can conclude from results that user's behavior change is usually related with self-efficacy, as for the change behavior on public welfare, personal intentions plays an important part.

6. Discussions

It can be seen that, as the foundation of the platform, the usefulness and reputation of the platform doesn't affect the self-efficacy easily. Users often make public benefits and use software for the fun of the platform and the purpose of getting friends together. On the one hand, we think that the public welfare platform is a platform that emphasizes social interaction rather than functions. On the other hand, in terms of the design of the Internet public welfare platform, more emphasis is placed on the interaction of the platform and user participation, and more public welfare ways are designed to keep users fresh on the platform.

The change of users' public welfare behavior has a great relationship with intention, self-efficacy on public welfare and self-efficacy on platform. And proportion of intention has reached 0.817. That means users always choose project of public welfare by their interests, if they like it, they will try to participate in it.

When the platform changes users' software behavior habits, it doesn't mean that user's behavior on public welfare can be changed easily. Therefore, the platform needs to design the platform with characteristic of enjoyment and social value. At the same time, environmental protection and other public welfare knowledge can be used in the design, so it will enhance users' awareness of environmental protection and public welfare. With combination of users' usage habits, behavior change on public welfare can come into being gradually.

7. Conclusion

In order to explore how internet public welfare platform affects user's behavior, this paper builds a model based on AT, and take platform design as well as user's participation into consideration. Then we conduct a questionnaire survey to test our hypotheses of model. The results shows that enjoyment, social value and perceived social support have significant impacts on user's self-efficacy. Self-efficacy will positively affect behavior change on platform and public welfare, user's intention is always the important part in changing user's behavior in terms of public welfare.

Some theoretical advice can be provided. First, compared with traditional public welfare organizations, internet-based public welfare platforms should pay more attention to social participation, which requires the platform to focus on the fun of the platform in the design. Secondly, as an Internet platform, though users don't think much about technical foundation, but the platform still needs to do well in usefulness and reputation, because technical foundation is always the basic of a platform. Finally, the primary duty of an internet public welfare platform is to encourage more people to participate in public welfare, and personal use in platform always influences public welfare behavior change, it is crucial to put public

welfare knowledge into daily behavior use and strength the interaction between users and the platform.

This research makes some contributions. First, the study makes new attempts to combine activity theory with information system. Secondly, this study provides theoretical analysis and suggestions for Internet public welfare platforms design in terms of how to influence users' public welfare behaviors. However, there are still some limitations in the research. First of all, most of our research objects are students in school, which might take deviation of sample collection. In addition, based on the activity theory, we just take the influencing factors of instruments and community for subjects. In addition, the object, rules and other factors may also have certain impacts on user's behavior change. In the future, other elements in activity theory will be used to enrich the model, and the data samples will be collected reasonably.

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