



Research on the Influencing Factors of Beijing Residents' Used Mobile Phones Network Recycling Willingness

Zhou Sanyuan, Yang Xiaojuan

Logistics department, Beijing Wuzi University, Beijing, China

Email address:

543076886@qq.com (Yang Xiaojuan)

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Abstract: The rapid replacement of mobile phones make our country faces serious recycling situation. How to drive residents to actively participate in the regular network recovery, it is worth exploring. Aiming at this problem, this paper use the TPB theory as the instruction and structural equation model for research method. In-depth analysis of the influence factors of Beijing residents to participate in the discarded mobile phones will, in order to put forward suggestions for improvement, enhance the residents' participation.

Keywords: Mobile Phones Recycling, Recycling Intention, Theory of Planned Behavior, Structural Equation Model

1. Introduction

In recent years, with electronic products renewal speed up, our country has already entered a peak of scrap of electronic products. Theory of scrap quantity is more than 5.0 million a year, and is growing at an annual 20% [1]. In March 2010, the International famous market research company--Nielsen, including 19 cities across mainland China 4946 patients 15 years old and above the consumers faced the surface accessible field survey, released the < Chinese mobile phone market insight report. The report said mobile phone users in China has reached 755 million people, over half of the total population of China. Because each person has one or more mobile phone, almost all have a cell phone out, so discarded mobile phones are very common [2].

At present, the mobile phone recycling market is facing a very embarrassing situation. Individual traders are the mainstream of the recycling. However, they lack specification and dismantling machines, processing technology, which directly lead to the serious resource waste and environmental pollution problems [3-4]. At the same time, formal recycling enterprises are faced with a small amount of recovery, can't be a normal operation of the situation. The reason mainly lies in the lack of awareness of the residents to participate in the formal recycling. The source of the recycling system is consumer. Their attitudes and behavior of recycled directly affect the effectiveness of recycling [5]. Therefore, to explore

the factors that influence the residents to participate in the mobile phone normal recovery and reasonable guide residents choose normal network recycling channels, to solve the problem of mobile phone waste has major practical significance.

2. Research Design

2.1. Theoretical Model and Research Hypothesis

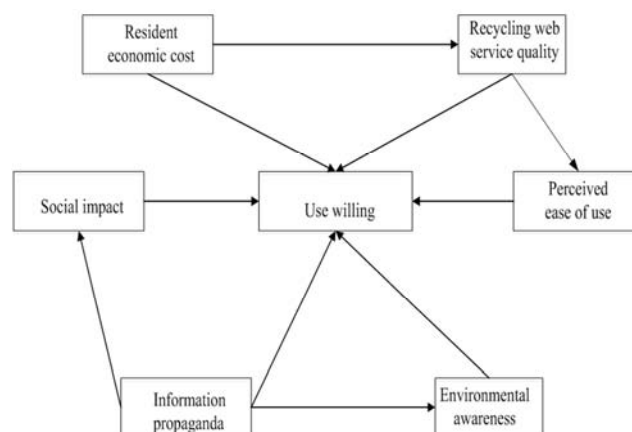


Figure 1. Theoretical model.

Through the literature review can be learned scholars at home and abroad for residents to participate in the study on mobile phone waste, mostly in the guidance of the theory of planned behavior. They cite demographics, subjective norm, and situation factors recycling habits, income and other variables [6]. In this paper, on the basis of previous studies, combined with the specific circumstances of Beijing City, we selected residents of the economic cost, website service quality, social influence, perceived ease of use, information publicity, environmental protection and other cognitive variables, such as shown in Figure 1.

According to the theoretical model, this paper put forward the research hypotheses. Hypothesis 1: residents of the economic cost and its willingness to use is negative correlation. Hypothesis 2: residents of the economic costs and website service quality are positively related. Hypothesis 3: website service quality and the residents use intention are positively related. Hypothesis 4: website service quality and perceived ease of use are positively related. Hypotheses 5: residents perceived ease of use and intention to use have positive correlation. Hypotheses 6: social influence and use intention have positively relations. Hypotheses 7: information publicity and residents use intention are positively linked. Hypothesis 8: information propaganda and social influence are positively related. Hypothesis 9: information propaganda is positively related to environmental protection. Hypothesis 10: environmental awareness and willingness to use are positively correlated.

2.2. Data Sources

The data used in this paper comes from the questionnaire survey. In order to facilitate the respondents to answer, the paper only selected used mobile phone as the research object to investigate, and the scope of the questionnaire is limited to the Beijing city.

2.2.1. Questionnaire Production

Answers to the questionnaire using Likert scale form, this paper chooses five Likert table [7]. A total of five alternative scores 1-5, indicating that consumer agree on every problem statement, according to the different statements, answer expression is also different. The higher the score, the more agree with the statement of the problem. The lower the score, the less agree with the problem.

2.2.2. The Pre-test

For as much as possible to guarantee the credibility, the scientific nature and effectiveness of the questionnaire, first of all, a medium-sized residents in Beijing Chaoyang district as the object of investigation has carried on the questionnaire test. Pre-test 120 electronic questionnaire and paper questionnaires are distributed, recycling effective questionnaire 103, effective recovery rate was 85.8%. According to the results of the pre-test questionnaire for initial adjustment, adjust the results as shown in table 1.

Table 1. Research model measuring system.

Variable	Questionnaire content
Use willing (UV)	If you have idle waste mobile phone, will you choose the network recovery mode? (UV1)
	Would you like to spend more time to understand network recycling way? (UV2)
	Are you willing to take the initiative to contact network recyclers? (UV3)
	Are you willing to take the initiative to share network recycling experience with friends and colleagues?(UV4)
Information propaganda (IP)	Do you know discarded mobile phones will pollute the environment or harm to human health? (IP1)
	Do you know there are still a lot of material in the mobile phone can be extracted? (IP2)
	Do you know the disadvantages of mobile phone informal processing pattern? (IP3)
	Do you think of discarded mobile phone related propaganda is very important? (IP4)
Environmental awareness (EA)	Are you very concerned about environmental problems at ordinary times? (EA1)
	Do you think daily habits can affect the surrounding environment? (EA2)
	Do you think that every citizen should contribute to environmental protection? (EA3)
	Do you feel discarded mobile phones will make life more beautiful? (EA4)
Resident economic cost (EC)	Can you accept the higher sales price for recycling? (EC1)
	Will network recycling prices directly affect your recycle behavior? (EC2)
	Whether you can accept the transportation cost of the electronic waste to recycling branch? (EC3)
	Can you accept the recycling and pay the processing fee? (EC4)
Recycling web service quality (WQ)	Compared with the traditional recycling way, do you think through the network for discarded cell phone is convenient? (WQ1)
	Do you think recycling website will protect consumers' personal information, don't because of the reason of artificial leak and steal personal information? (WQ2)
	Do you think the network recovery of the price will be higher than street peddler? (WQ3)
	Do you think recycling website should have communication channels between consumers, such as BBS, chat rooms, etc? (WQ4)
Social impact (SI)	Do you think the website page design effect, its ease of use will affect whether you choose recycling network? (WQ5)
	Will you feel do more contribution to society by using recycling waste mobile? (SI1)
	Do more and more people begin to understand, adopt the recycle behavior around you? (SI2)
	Do you think using the network recovery will become a popular trend ? (SI3)
Perceived ease of use (PU)	Do you think the surrounding network recycling facilities is not complete? (PU1)
	Do you have enough time, energy to send mobiles to the collection points ? (PU2)
	Whether can you easily search to a variety of recycling sites? (PU3)
	For you, is the site recycling process easy to complete? (PU4)

2.3. Statistical Analysis of Data

Based on the sina weibo and tencent weibo and each big BBS, we choose those who have experienced network know recovery or recycling of network consumers, through E-mail, questionnaire star and three ways to complete the questionnaire. 310 questionnaires collected, and finally 274

valid questionnaire responses received.

2.3.1. Descriptive Statistics

This article use SPSS20.0 software on the sample of gender, age, record of formal schooling and income distribution statistics and the analysis of the differences. The analysis results are shown in table 2

Table 2. Basic data description.

The basic information		Percentage (%)	The basic information		Percentage (%)
Gender	Male	58.1	Educational Background	High school / vocational technical school	19.1
	Female	41.9		Junior college / University	40.8
Age	20-30 years old	52.2		Master degree and above	32.3
	30-45years old	32.7	Income	Less than2000	15.6
	46-60years old	11.2		2000-4000	26.2
	60years old	3.9		4000-7000	52.3
Educational Background		Junior high school and below	7.8	More than 7000	5.9

From the overall point of view, the gender, age, education, monthly income structure are more reasonable, in line with the requirements.

2.3.2. Reliability test and Validity Test

The alpha coefficient is used for reliability test. All items were less than 0.7, as shown in Table 3 shows. Measurement

project design is more reasonable and has good stability and consistency. In validity test, the variables of KMO value were greater than 0.7, Bartlett ball test probability p- values are 0 and reached significant, indicating that has good reliability and validity.

Table 3. Questionnaire reliability test.

Latent variable name	Questionnaire code	Cronbrash'Alpha
Use willing	UV1, UV2, UV3, UV4	0.794
Information propaganda	IP1, IP2, IP3, IP4	0.871
Environmental awareness	EA1, EA2, EA3	0.838
Resident economic cost	EC1, EC2, EC3	0.735
Recycling web service quality	WQ1, WQ2, WQ3, WQ4, WQ5	0.861
Social impact	SI1, SI2, SI3	0.821
Perceived ease of use	PU1, PU2, PU3, PU4	0.799

3. Empirical Analysis

3.1. Model Calculation

AMOS21.0 software was used for structural equation modeling and calculation, the path analysis of the equation model, to get the model equation analysis, validity and the goodness of fit index and other indicators.

Table 4. hypothesis validation results.

	Estimate	S. E.	C. R.	P	Significant
Economic cost→Use willing	3.882	0.971	3.998	***	Sig.
Economic cost→Recycling web service quality	0.874	0.093	9.398	***	Sig.
Information propaganda→Social impact	0.618	0.164	3.768	***	Sig.
Economic cost→Recycling web service quality	0.829	0.075	11.053	***	Sig.
Recycling web service quality→Perceived ease of use	-0.423	0.121	-3.496	0.008	Sig.
Information propaganda→Use willing	2.823	0.471	5.994	***	Sig.
Social impact→Use willing	0.201	0.056	3.589	***	Sig.
Environmental awareness→Use willing	0.165	0.069	2.391	0.013	Sig.
Perceived ease of use→Use willing	0.882	0.105	8.400	***	Sig.

Model path coefficient is shown in figure 2. Among them, the figure stands for standardized path coefficient.

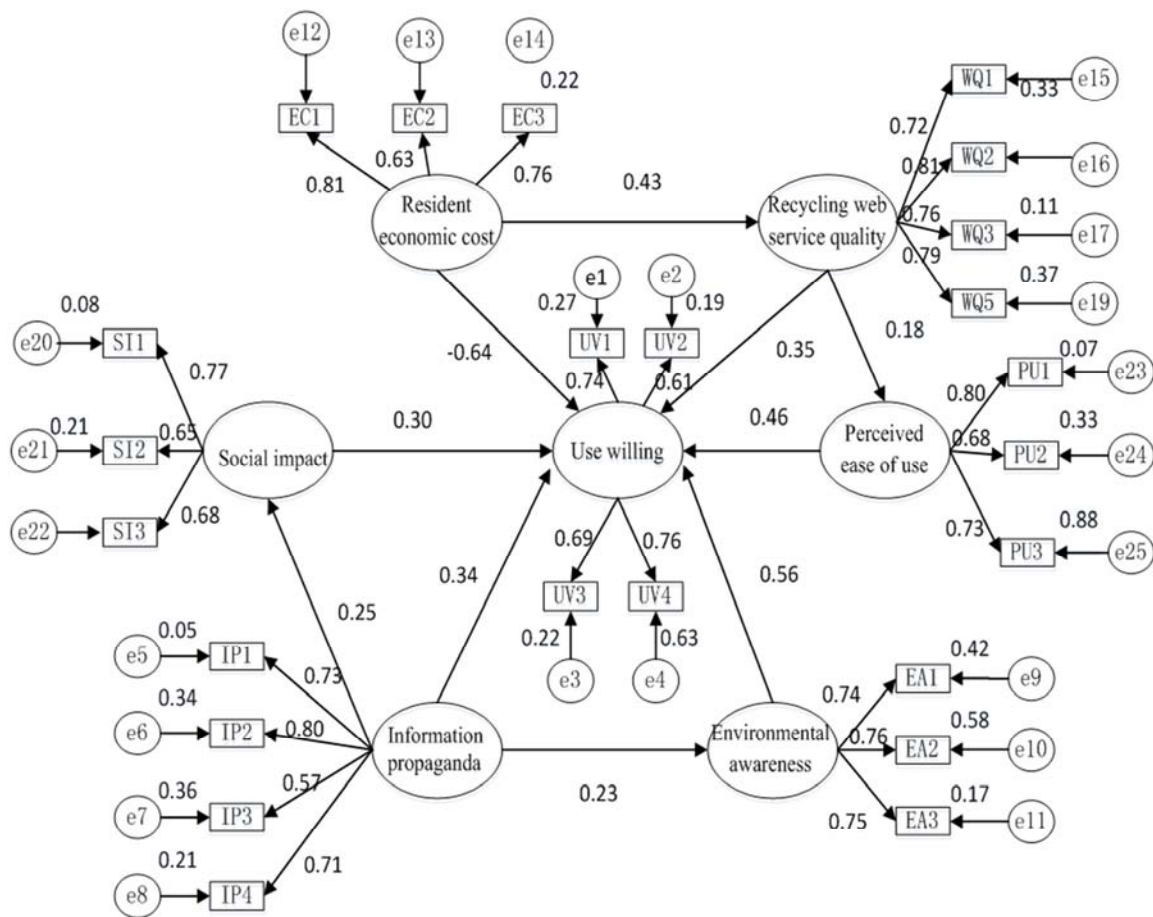


Figure 2. Distribution map of path coefficient and factor loading.

3.2. Model Evaluation

After solving the model of waste mobile phone recycling behavior based on structural equation model, the model should be further tested for the overall fitness of the model. If the fit is not good, it is indicated that the theoretical model and the matching degree of the data is not high, it is necessary to model the model to ensure that the model can meet the requirements of the degree of fit [8-9]. The evaluation indexes of fitting degree mainly include the absolute fit index, the relative fit index and the index of short effect fitting. The evaluation standard of each index is shown in Table 5.

Table 5. evaluation criteria of overall model fit.

	Fitting index	Judgment criterion	Actual test results
The fit of the absolute indicators	CMIN	The smaller the better	32.452
	GFI	>0.9	0.926
	AGFI	>0.9	0.982
	RMR	<0.5	0.343
	RMSEA	<0.1	0.067
The fit of the value-added indicators	NFI	>0.9	0.986
	CFI	>0.9	0.962
	IFI	>0.9	0.936
	RFI	>0.9	0.973
The fit of the contracted indicators	PGFI	>0.5	0.673
	PNFI	>0.5	0.772

From the point of view of the fitting degree, the model fit is basically in line with the requirements, and the model can fit the sample data well.

4. Conclusion

Based on the theory of planned behavior, this paper constructs a theoretical model, puts forward the research hypothesis, and then takes Beijing city as an example to verify the model by using the structural equation model. The study revealed that the residents of the recycling of discarded mobile phones will directly influence factors include: economic cost, perceived ease of use, information publicity, intermediary factors including network service quality, social influence, environmental awareness. From the questionnaire results of the analysis can be seen, the economic cost of using coefficient of willingness of 0.971 and information on the use of the coefficient of the wishes of 0.471 and social impact on the use of coefficient of willingness to 0.056, environmental awareness on the use of coefficient of willingness to 0.069, perceived ease of use on the use of coefficient of intention is 0.105.

Preliminary summary: (1) the impact of economic costs and information on the use of information is significant, residents of the recycling price and the cost of recycling is sensitive, continue to reduce the cost of recovery, improve the income of

residents. Promote information publicity, so that residents fully understand the new ways of recycling network, will help improve the recovery of the will. (2) social influence, environmental awareness, perceived ease of use on the recovery will have little effect, reflecting the social environment, residents have not yet formed to awareness of the effective recycling of discarded mobile phones, and the harm of old mobile phones do not know the place, has not formed a more convenient recycling network channels.

In view of this, this paper argues from the following specific aspects to enhance the enthusiasm of residents to participate.

- (1) In terms of network recovery, improve the recovery of prices, to ensure fair trading [10]. As we all know, the current online recycling sites springing up, want to profit from the recovery of more and more, but the competition is becoming more and more intense. Recycler can be stimulated by high prices of recovery to allow residents to obtain from the traditional way of recovery do not enjoy the benefits, stimulate residents some potential recovery needs, also can ensure their competitive edge in the recycling industry.
- (2) For the government and the media, to increase the intensity of the laws and regulations and information publicity. Through the joint efforts of the government and the media, increase the legal ways of recycling promotion, put an end to acts of illegal dismantling of small traders, small workshops. At the same time, residents can keep abreast of policy trends, in response to the national call. A few years ago, the government for the old home appliances to the old new environmental action, so many residents to participate actively in the harvest of significant results. Today, we can learn from the old for the successful experience of the formal recycling of the site for financial subsidies, to mobilize the enthusiasm of the recovery of the recycling business. At the same time, the news media as the media of information, should vigorously promote the importance of the formal recycling, economic value and far-reaching environmental value, reasonable guide residents of waste mobile phone network recovery.
- (3) For network platform managers, to simplify the operation process of residents, to protect the safety of transactions. Constant reform and innovation of the website of the transaction, to enhance the recycling of the site's interactivity, convenience and security, improve the level of personalized service website. As

residents participate in the recycling of the window, recycling the site icon and service information in the design should be both practical and attractive, to fully mobilize the enthusiasm of consumers. In addition, recovery platform can also establish residents like a value-added service module, depth of excavation user needs, provide more services to the rich to allow residents to both to actively participate in recycling network, and can enjoy the recycling network of value-added pleasure.

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