Empirical Study on the Recycling and Disposal of Used Mobile Phones

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Abstract: Against this backdrop, this paper focuses on the used mobile phones from major universities in Nanning, Guangxi Province, with a particular emphasis on the attitudes of university students towards the recycling and disposal of these devices. The aim is to provide a data foundation and scientific basis for the rational recycling and disposal of used mobile phones in Nanning, Guangxi Province, and society at large. An empirical study was conducted on the recycling behavior, behavioral intentions, and influencing factors among university students. This study employed a combination of survey research and literature review, primarily using sampling surveys. Through a combination of stratified sampling and cluster random sampling, and utilizing statistical software SPSS, factor analysis and regression analysis were performed. The results indicate that the behavioral intentions and actions of university students regarding the recycling of used mobile phones have a significant positive impact. Based on these findings, appropriate and scientifically sound recycling recommendations are proposed.

***Keywords*:** used mobile phones; university student group; recycling behavior attitude; major influencing factors.

1. Introduction

The recycling of electronic waste, particularly discarded mobile phones, has received significant attention at both national and local levels. The Nanjing municipal government has clearly stated that by 2025, the waste recycling network system will be more complete, with accelerated standardization of sorting centers, and a basic establishment of a well-planned, well-managed, efficient, and convenient waste recycling network system. Among these, university students are major consumers of electronic products, represented by mobile phones, and are also one of the main producers of discarded mobile phones. Due to their unique behavioral characteristics, namely relatively high education and quality, university students become a specific research subject. The recycling behavior of contemporary university students greatly influences the future state of mobile phone recycling in Chinese society, leading to considerations on how to establish a high-level mobile phone recycling and processing network system.

This paper investigates the key factors influencing the recycling behavior of university students in Nanning regarding discarded mobile phones through a series of surveys. It discusses strategies to improve the recycling rate of mobile phones among university students from four major dimensions, inspiring contemporary university students to pay attention to discarded mobile phones and enhancing their awareness of environmental protection.

2. Literature Review

2.1 Current Status of E-Waste Generation

According to statistics, the number of mobile phone users in China reached 1 billion in 2012 [1]. By September 2017, this number had increased to 1.21 billion, and by October 2022, it had reached 1.316 billion [2]. The rise in the number of mobile phone users has directly led to a surge in the number of discarded phones. In 2012, the replacement cycle for mobile phones among Chinese mobile users had gradually shortened from 3-5 years to 18 months, with the total amount of electronic waste in China reaching 11.1 million tons, accounting for 22.7% of the global total [3]. From 2000 to 2015, the generation of electronic waste in China has been increasing annually [4]. Behind these massive figures is the growing consumer demand for electronic products such as mobile phones and computers, as well as the accelerated pace of replacement.

2.2 Current Status of E-Waste Recycling

The main recycling channels for obsolete electronic products in China include individual recycling channels, electronic product recyclers, "trade-in" programs by sales enterprises, and government agency recycling channels [5]. Currently, although there are diverse recycling channels for obsolete electronic products in China, the recycling methods that are visibly accessible to consumers are relatively few, resulting in significant impacts on recycling due to factors such as distance and time [6].

3. Research Hypotheses and Empirical Analysis

3.1 Research Hypotheses

Based on the Theory of Planned Behavior (TPB), the hypotheses proposed in this paper are as follows:

H1: The intention of university students to participate in the recycling of discarded mobile phones has a significant positive impact on recycling behavior; the stronger the intention, the more likely they are to engage in recycling behavior.

H2: The subjective norms of university students have a significant positive impact on their intention to recycle discarded mobile phones.

H3: The behavioral attitudes of university students have a significant positive impact on their intention to recycle discarded mobile phones.

H4: External factors have a significant positive impact on university students' intention to participate in the recycling of discarded mobile phones.

H5: The environmental knowledge possessed by university students has a significant positive impact on their intention to recycle discarded mobile phones.

H6: The personal economic factors of university students have a significant positive impact on their intention to recycle discarded mobile phones.

3.2 Correlation Analysis

(1) Analysis of the Correlation between Environmental Knowledge and Consumers' Willingness to Recycle.

The correlation coefficient between environmental knowledge and consumers' willingness to recycle is 0.552, showing significance at the 0.01 level. This indicates a significant positive correlation between environmental awareness and consumers' willingness to recycle.

(2) Analysis of the Correlation between Economic Factors and Consumers' Willingness to Recycle.

Pearson's correlation analysis reveals that the correlation coefficient between economic factors and consumers' willingness to recycle is 0.053, with significance at the 0.01 level. This suggests no significant correlation between economic factors and consumers' willingness to recycle.

(3) Analysis of the Correlation between Subjective Norms and Consumers' Willingness to Recycle.

Pearson's correlation analysis shows a correlation coefficient of 0.426 between subjective norms and consumers' willingness to recycle, with significance at the 0.01 level. This indicates a positive correlation between subjective norms and consumers' willingness to recycle.

3.3 Regression Analysis

The regression analysis results indicate: First, subjective norms, environmental knowledge, and economic factors have a significant positive impact, thus accepting hypotheses H2, H5, and H6. Second, based on standardized coefficients, the importance of the four influencing factors is ranked as follows: subjective norms > economic factors > environmental knowledge, with the impact gradually decreasing. Third, in the regression analysis, the P-values for external factors and behavioral attitudes are 0.284 and 0.212, respectively, which are greater than 0.05, indicating no statistical significance. Therefore, external factors and behavioral attitudes do not significantly impact behavioral intentions, leading to the rejection of hypotheses H3 and H4.

4. Conclusions and Discussion

Through field visits and questionnaire surveys, this study statistically analyzed the respondents' personal basic information and influencing factors, collecting 220 valid questionnaires. Using SPSS and other analytical tools, empirical research was conducted on the sample data, leading to the following conclusions:

(1) Behavioral attitudes, subjective norms, and behavioral control significantly influence university students' recycling behavior of old mobile phones, with subjective norms having the highest correlation, followed by behavioral attitudes, while behavioral motivation shows a certain correlation with recycling behavior.

(2) Situational factors have a certain connection with the recycling behavior of old mobile phones, with the lack of recycling points inhibiting students' recycling behavior.

(3) University students are dissatisfied with the current state of old mobile phone recycling, believing that improvements are still needed.

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