

Research on the Current Situation and Improvement Strategies of Express Packaging Recycling in Colleges and Universities Under the Background of Dual Carbon

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Abstract: Under the background of China's promotion of green and sustainable development and garbage classification policies, the amount of express packaging waste in colleges and universities has surged, resulting in prominent problems of resource waste and environmental pollution. As the main force of online shopping consumption, college students' willingness to recycle express packaging directly affects the efficiency of green campus construction and resource recycling. Based on the Theory of Reasoned Action (TRA), this paper adopts questionnaire survey method, statistical analysis method and literature analysis method, taking 131 college students as the research object, to explore the impact of recycling attitude, subjective norms and related external factors on their willingness to recycle express packaging. The study found that both recycling attitude and subjective norms have a significant positive impact on recycling willingness, and the popularization of environmental protection knowledge, personal information security protection, recycling reward mechanism and policy publicity all indirectly affect recycling willingness by influencing attitude or subjective norms. Based on the research conclusions, optimized suggestions are put forward from three levels of government, colleges and universities, and individuals to provide reference for improving the express packaging recycling system in colleges and universities.

Keywords: Green Campus, TRA Theory, Express Packaging Recycling, Recycling Willingness.

1. Introduction

With the rapid development of e-commerce, online shopping has become a major consumption mode for college students, resulting in a sharp increase in express packaging waste. China wastes more than 50 million tons of express packaging resources each year, causing serious environmental problems. Although China is actively promoting waste sorting and green development, most universities lack a complete express packaging recycling system. Low environmental awareness and random disposal of packaging are common, leading to resource waste and environmental pressure on campus.

As a well-educated and concentrated group, college students are crucial to promoting express packaging recycling. The Theory of Reasoned Action (TRA), proposed by Fishbein and Ajzen (1974), states that behavioral intention is determined by attitude and subjective norms, which provides a solid theoretical basis for this study.

Stock [1] (1981) first put forward the concept of recycling logistics and laid the foundation for relevant research. In China, Chen Lili [2] designed an intelligent recycling system based on big data; Zhu Jingwen et al. [3] analyzed existing problems in campus recycling logistics; Sun Yao [4] focused on environmental awareness cultivation; and Wang Ke et al. [5] investigated the current situation of recycling. Although previous studies have covered many aspects, systematic research on college students' recycling willingness based on TRA is still insufficient. Therefore, this paper analyzes the key influencing factors and proposes targeted strategies to improve the recycling system in universities.

2. Analysis of the Current Situation of Express Packaging Recycling in Colleges and Universities

Based on 131 valid questionnaires of college students (95.6% effective recovery rate), combined with field survey results and relevant research, this paper systematically analyzes the current situation of express packaging recycling in colleges and universities from five aspects, laying a realistic foundation for subsequent analysis and strategy formulation.

2.1. Characteristics of Express Packaging Generation

As the main force of online shopping, college students purchase most of their daily and learning supplies online, including large and small items. The high proportion of fragile items leads to the prevalence of "excessive packaging". Surveys show that college students receive many express deliveries monthly, and their packaging mainly consists of cartons, plastic bags, foam fillers and tape. Cartons and other recyclable materials account for a high proportion, most of which are intact and have high secondary recycling value.

However, most recyclable packages are randomly discarded as ordinary garbage, and only a few are sold to waste markets, causing serious resource waste. Non-degradable materials in packaging will further burden the campus environment, conflicting with the dual-carbon green development concept. In addition, the lack of comprehensive garbage classification in colleges increases recycling difficulty and resource consumption.

2.2. College Students' Cognition and Attitude towards Recycling

Cognitively, most college students understand the

environmental significance of express packaging recycling, with over 85% agreeing that "everyone should actively participate in it". However, their cognition is not in-depth: only 30.53% clearly know the relevant laws and regulations, and 21.37% often obtain publicity information. Some are unclear about recycling processes and channels, and relevant campus education is insufficient.

Attitudinally, college students are generally positive: 48.85% completely agree that recycling is meaningful, and 42.75% regard it as a social contribution. However, contradictions exist: 32.06% worry about personal information leakage, and 34.35% will not recycle again if information is leaked; some have weak environmental awareness and hold an indifferent attitude.

2.3. Performance of College Students' Recycling Behavior

Survey data shows an obvious disconnection between cognition, attitude and recycling behavior ("recognition in thought but lag in action"). Only 37.40% often recycle at express outlets, 27.48% often send packaging to recycling devices, and 29.01% have the experience of exchanging prizes through recycling.

Recycling behavior is greatly affected by external and personal factors: students tend to follow family and friends, but rarely participate if facilities are inconvenient or rewards are lacking. Busy schedules also lead some to discard packaging casually, and a few lack self-restraint.

2.4. Current Situation of the Existing Recycling System

Most colleges have not established a sound express packaging recycling system. Few have set up special recycling devices near express points and dormitories, which are insufficient in quantity, unevenly distributed, and often left uncleaned. Most colleges have no recycling facilities, leaving students with no channels to participate in recycling.

There is no special management and supervision mechanism; recycling is mostly undertaken by property or private staff, lacking professional management and personal information protection measures, which reduces students' trust. Reward mechanisms are missing or imperfect, failing to mobilize students' long-term enthusiasm.

Publicity efforts are insufficient and methods are single (mostly simple notices), lacking regular and diverse activities. National and local policy publicity has not fully covered colleges and universities, leading to insufficient student understanding and failure to form an active recycling atmosphere on campus.

2.5. Prominent Problems in Recycling Work

Comprehensively, four prominent problems exist: 1) an imperfect recycling system without professional management, complete facilities or standardized processes; 2) low student participation due to the disconnection between cognition and behavior, concerns about information security, and inconvenience; 3) inadequate publicity and education; 4) a lack of effective incentives, making recycling unsustainable and failing to effectively alleviate resource waste and environmental pollution.

3. Empirical Analysis and Strategies for Express Packaging Recycling

3.1. Research Hypotheses and Model Construction

Based on the TRA theory and relevant literature, this paper puts forward 7 research hypotheses: H1, recycling attitude has a positive impact on college students' willingness to recycle express packaging; H2, subjective norms have a positive impact on college students' willingness to recycle express packaging; H3, the popularization of environmental protection knowledge has a positive impact on subjective norms; H4, the degree of personal information security protection has a positive impact on recycling attitude; H5, the recycling reward mechanism has a positive impact on recycling attitude; H6, policy publicity has a positive impact on recycling attitude; H7, policy publicity has a positive impact on subjective norms.

This paper constructs a research model, with recycling attitude and subjective norms as mediating variables, the popularization of environmental protection knowledge, personal information security protection, recycling reward mechanism and policy publicity as independent variables, and express packaging recycling willingness as the dependent variable, to clarify the impact relationship between various variables.

3.2. Empirical Analysis

This paper adopts the questionnaire survey method to collect data, with a total of 137 questionnaires distributed and 131 valid questionnaires recovered, with an effective recovery rate of 95.6%. SPSS 26.0 software was used for reliability and validity analysis, correlation analysis and structural equation path analysis. The results of the reliability and validity test show that the KMO value of the questionnaire is 0.837, and the overall Cronbach's α coefficient is 0.920, indicating that the questionnaire has good reliability and validity, and the data is suitable for analysis.

Correlation analysis shows that all variables are significantly positively correlated with recycling willingness. Structural equation path analysis shows that the model has a good fit, and all research hypotheses are established: recycling attitude (standardized coefficient 0.225) and subjective norms (standardized coefficient 0.169) have a positive impact on recycling willingness; the popularization of environmental protection knowledge (0.493) has a positive impact on subjective norms; personal information security protection (0.284), recycling reward mechanism (0.383) and policy publicity (0.304) have a positive impact on recycling attitude; policy publicity (0.296) has a positive impact on subjective norms.

3.3. Countermeasures and Suggestions

Combined with the empirical research results, aiming at the key factors affecting college students' willingness to recycle express packaging, targeted countermeasures are put forward from three levels of government, colleges and universities, and individuals to promote the effective implementation of express packaging recycling work in colleges and universities.

At the government level, efforts should be made to develop a green industrial chain for express packaging, issue relevant policies to support recyclable packaging production and recycling enterprises, and provide financial and technical support; take colleges and universities as units to promote the

classified storage and centralized treatment of recyclable waste to form a scale effect; establish special environmental protection departments to standardize the waste recycling market and protect students' recycling rights and interests; increase publicity through official media, popularize the environmental significance and relevant policies of express packaging recycling, and guide the whole people to participate.

At the college and university level, it is necessary to establish and improve the campus express packaging recycling and supervision mechanism, employ reliable staff, standardize the recycling process, strengthen personal information protection, and eliminate students' privacy concerns; carry out on-site publicity through environmental protection associations, campus lectures and other forms to improve students' environmental awareness; implement the recycling reward mechanism, provide student-recognized return methods such as monetary payment and item exchange, and reduce the time and energy cost of students' recycling; add recycling facilities near dormitory buildings and express delivery points, expand the recycling scope, realize one-stop recycling, and improve recycling convenience.

At the individual level, college students should take the initiative to improve their environmental awareness, establish the concept of green consumption and recycling, and consciously participate in express packaging recycling practice; develop the habit of handling express packaging in a timely manner and taking the initiative to erase personal information, and cooperate with campus recycling work; actively publicize the importance of express packaging recycling to people around them, drive people around them to participate, and form a good recycling atmosphere.

4. Conclusion

Based on the TRA theory, this paper clarifies the main influencing factors of college students' willingness to recycle express packaging through empirical research. The study shows that recycling attitude and subjective norms are direct

factors affecting recycling willingness, and the popularization of environmental protection knowledge, personal information security protection, recycling reward mechanism and policy publicity are indirect influencing factors. At present, there are problems such as imperfect system and insufficient student participation in express packaging recycling in colleges and universities, which require the joint efforts of multiple parties.

This study still has certain limitations. The coverage of the research sample is narrow. In the future, the sample size can be expanded to explore the differences in recycling willingness of college students in different regions and grades. In the future, it can further combine other theories to deeply analyze the deviation between recycling behavior and recycling willingness, provide more targeted suggestions for the construction of express packaging recycling system in colleges and universities, and help the construction of green campus and resource recycling.

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