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# Analysis on the Characteristics and Driving Factors of College Students' Waste Classification Behaviors

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**Abstract:** With the development of economy and society, the consumption and demand of human resources are increasing rapidly. However, due to the unreasonable use of resources, serious environmental problems and resource wastes are caused. In people's daily lives, the amount of domestic waste is increasing gradually. How to recycle and utilize the domestic wastes reasonably has become the key means to solve the environmental problems and relieve the problem of resources shortage. Waste classification is a means of classifying and treating wastes according to their nature and potential values. In recent years, China is gradually promoting the classification of domestic wastes in cities, and has achieved preliminary results. The recognition and awareness of residents on waste classification, as well as the behavior of waste classification in daily lives could affect the waste classification. In this study, the students in Tai'an universities were taken as the research objects, and the understanding of environmental problems, waste classification awareness, and daily waste classification behaviors of college students were taken as the research contents. Through the questionnaire, the awareness and behaviors of waste classification of college students were investigated. The results showed that college students in Tai'an have a high recognition of waste classification, a good grasp of the basic knowledge of waste classification, and a good practice of waste classification in daily lives. In the process of promoting waste classification, in addition to increasing the popularization of waste classification knowledge and awareness, colleges and universities should also pay attention to the establishment and improvement of waste classification infrastructure, and develop a variety of incentive means to improve the awareness and behaviors of college students who are participating in waste classification.

**Keywords:** Waste Classification, College Students, Awareness, Behavior

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## 1. Introduction

With the development of economy and society, the demands of human beings for resources are becoming greater, and a large number of wastes generated as a result have caused serious environmental problems. With the development of urbanization, the domestic wastes produced in the daily lives of residents have gradually become problems that restrict the development of cities. Waste collection is conducive to the recovery and utilization of resources in the waste [1]. It can solve the environmental problems caused by waste and alleviate the problem of

resource shortage at the same time [2]. The traditional way of waste disposal is to mix the waste and place it in a special public place in the city, and then the municipal management department will collect and dispose it. This kind of mixed way increases the difficulty of waste collection, reduces the efficiency of waste disposal and increases the management cost [3]. Therefore, waste classification has become an important means to solve the above problems. According to the nature and available values of domestic wastes, the administrator shall formulate the principle of waste classification and guide the residents to classify the wastes. Waste classification at the source can improve the efficiency of waste collection and treatment, and reduce the cost of

urban management. At the same time, the implementation of waste classification is also conducive to improving the environmental quality of urban residents and promoting sustainable development [4].

In the 1960s, developed countries gradually carried out waste classification, and carried out research on the influencing factors of household waste classification and urban waste classification systems [5-7]. After a long time practice, developed countries in the relevant classification methods, facilities, incentives, and punishment measures are relatively perfect [8-10]. Japan has established a waste classification mechanism with citizen participation as the center, and achieved good results through five aspects of citizen participation, education and publicity, legal constraints, policy incentives, and multi-agent collaborative governance [4, 11].

Compared with European and American countries, China's waste classification started very late. In 2000, the former Ministry of Construction of the People's Republic of China took Beijing and other eight cities as pilot cities for waste classification. Since then, governments at all levels have actively promoted waste classification through publicity, education, system construction and other aspects. Domestic researchers have carried out a lot of researches on the systems of waste classification, residents' willingness and behavior of waste classification, urban waste classification facilities, community participation, and incentive measures [12, 13]. In 2019, Shanghai Municipality issued the regulations of Shanghai Municipality on the administration of domestic waste, which incorporated waste classification into the legal framework of the city as a resident's obligation, marking Shanghai's entry into the "mandatory era" of waste classification [14]. At the beginning of 2020, Shandong Province issued the implementation plan for the classification system of municipal solid waste in Shandong Province, which regulates the classification and treatment of municipal solid waste in Shandong Province, and divides the domestic

waste into five categories: hazardous waste, recyclable waste, kitchen waste, professional waste and other waste.

As a special group of urban residents, the behavior characteristics of college students are similar to and different from that of the urban residents. Research shows that college students are highly educated and more likely to accept new concepts such as waste classification, which has a significant driving effect on other groups [15]. At the same time, college students come from different regions, with different economic development and family income levels, resulting in the difference of consumption levels [16]. Therefore, there is a good reference significance to understand the awareness and behaviors of College Students' waste classification for improving the effect of urban waste classification.

## 2. Materials and Methods

Based on the data of Statistical Yearbook (2018) of Tai'an City, there are 9 universities in Tai'an City, including Shandong Agricultural University, with 127000 students in total. Through the investigation of the students in school, we can understand the understanding of waste classification and the popularity of related behaviors in life.

Through literature research, we can understand the connotation of waste classification, and understand the behavior characteristics of contemporary college students. According to the theory of knowing, believing and doing, the basic model of this study is constructed and the questionnaire is designed. We collected the basic information of the respondents, including gender, age, source of students and monthly living expenses (reflecting the consumption level of the respondents), analyzed the impact of various factors on the cognition of waste classification, and used the questionnaire to investigate the waste classification behavior of college students in daily life, to explore the correlation between waste classification awareness and behavior.

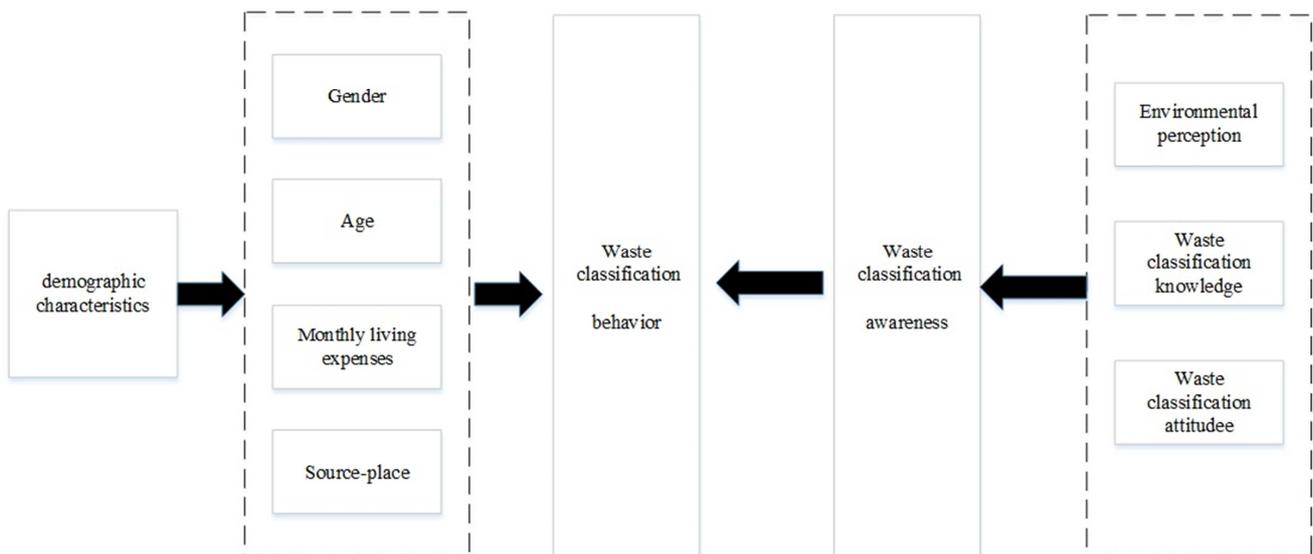


Figure 1. Pattern of waste classification behavior of college students.

The questionnaire used in this study is divided into four parts:

The first part is the beginning of the volume. It mainly introduces the background of the survey to the respondents and gives a simple description of waste classification, so as to facilitate the respondents to answer better.

The second part is the basic information of the respondents. It is mainly used for statistics of demographic characteristics, including gender, grade, source of students and monthly living expenses of the respondents.

The third part investigates the knowledge and attitude of waste classification of college students, including the understanding of current environmental problems - current situation and reasons, the understanding of waste classification and the role of waste classification in environmental protection.

The fourth part investigates the waste classification of college students, and designs problems according to the basic ideas of clothing, food, housing and transportation, including college students' daily shopping, diet, travel choice and behavior habits of saving resources and energy.

The questionnaire was distributed through the network for investigation and data collection, supplemented by offline paper-based questionnaire survey. The distribution and collection of questionnaires were concentrated in March 2020, and 134 valid questionnaires were collected. All the data in this study were sorted out by Windows Office software, and statistical analysis was carried out by SPSS statistics 17.0 software. Independent sample t-test or variance analysis were carried out for the relevant indicators.

### 3. Results and Discussion

#### 3.1. Sample Distribution of Respondents

The research object of this paper is mainly the students of Shandong Agricultural University in Tai'an. Among the 134 valid questionnaires collected, undergraduates were the main ones, and 11.94%, 14.18%, 39.55% and 33.58% of them were freshmen to seniors respectively. In addition, we also made statistics on the family background of the respondents, that is, the source of students. 33.58% of the surveyed college students came from the city, 66.42% from the countryside. Through the analysis of the questionnaire, the monthly living expenses of the surveyed college students are 800-1200 yuan, accounting for 52.99%, followed by 1200-1500 yuan, accounting for 26.87%.

#### 3.2. College Students' Cognitive Analysis of Waste Classification

At present, the global ecological environment problem is one of the important reasons for the implementation of waste classification, so we first analyzed the group's understanding of environmental problems in the waste classification survey of college students. Among all the respondents, the vast majority think that the current ecological environment is average, accounting for 74.63%, 15.67% think that the current environment is poor, only 9.7% think that the current

environment is good.

In the investigation of the causes of current ecological environment problems, we have given five aspects: "unreasonable production mode, bad life style, disordered resource development, poor environmental awareness of residents and inadequate management". The data shows that more than 13% of the five options given are selected, and the respondents believe that these five aspects have a negative impact on the ecological environment. 34.33% of the respondents choose the option of "poor environmental awareness of residents" (Figure 2), which shows that college students are most concerned about the individual responsibility of citizens in environmental protection.

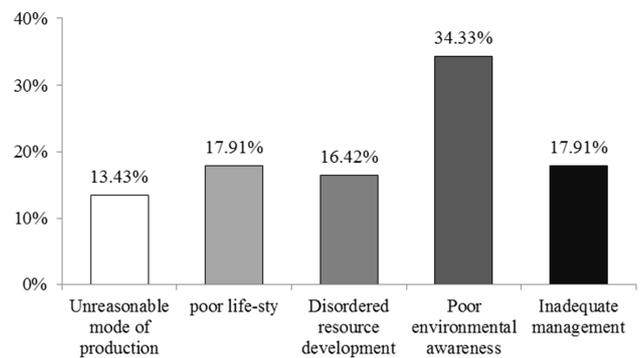


Figure 2. Distribution of College Students' opinions on the causes of environment problems.

As for the cognition of waste classification, we investigated the understanding of college students on waste classification. 23.13% and 71.64% of the respondents had a good understanding of waste classification, while 4.48% of the respondents did not know about waste classification. Therefore, college students have a higher understanding of waste classification.

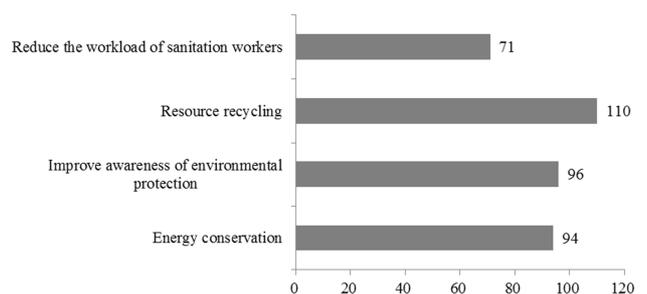


Figure 3. College Students' understanding of waste classification.

In order to more accurately understand the cognition of the respondents to waste classification, we designed multiple topics - "what do you think is the benefit of waste classification and recycling?" The typical functions of four kinds of waste classification, namely "saving energy, improving residents' environmental awareness, recycling resources and reducing the amount of sanitation workers", were selected by the respondents. The results show that the

selection rate of the four types of waste classification is over 52%, the highest is "resource recycling" 82.09%, followed by improving the environmental awareness of residents 71.64% (Figure 3), which shows that college students' understanding of the role of waste classification is at a high level.

**3.3. Analysis of College Students' Waste Classification Behavior**

According to the survey results of College Students' waste classification behavior, nearly half (44.78%) of the respondents will classify the domestic waste, and 26.87% of the respondents pay attention to the classification of waste batteries and other harmful waste. At the same time, 54.48% of the respondents said that even if there is no waste sorting facility in the living area, the waste will be sorted. This shows that in the campus without comprehensive implementation of waste classification, college students still have a high awareness of waste classification and show a conscious behavior of waste classification. 23.88% of the respondents still pay attention to waste classification when they leave school and return home, which shows that the waste classification behavior of college students has a good inertia in different scenarios. However, the management of waste sorting facilities is also very important. If the waste sorting facilities are dirty, it will have a negative impact on 60.45% of the respondents. In addition, 68.66% of the respondents are willing to implement the reward and punishment system for the management of waste classification in the school area, so as to promote the waste classification in the school area, showing the high environmental awareness of college students and the recognition of relevant systems. For the specific measures of rewards and punishments, the respondents' answers also reflect the obvious campus characteristics. 67.91% of the respondents believed that "the evaluation condition of waste classification in civilized dormitories" could improve the enthusiasm of waste classification of the students in school, and the support rate of "reward gift" and "reward water and electricity cost" was more than 65%. Only 23.88% of the respondents believed that the "fine" could promote the waste classification on campus, indicating that the respondents were very cautious about the punishment measures.

**3.4. Factors of College Students' Waste Classification Awareness and Behavior**

Based on the analysis of the survey data, we summarized the demographic characteristics of the survey objects, tested the main effect according to the four factors of gender, age, monthly living expenses and source area, and compared the waste classification awareness, cognition and related behaviors in life of the survey objects.

There are only significant differences in the cognition of waste classification among the respondents of different genders, and women's cognition of waste classification should be more comprehensive (Table 1). In terms of the awareness of waste classification, including the

environmental perception and understanding degree related to waste classification, there is little difference between the two genders. In the aspect of waste classification behavior, the gender is also very similar. Women tend to treat things more carefully and master more knowledge than men.

*Table 1. Results of independent sample t-test on the difference of waste classification awareness and behavior between different genders.*

	t	p	Gender	
			Male	Female
Environmental perception	-0.70	0.945	1.94±0.07	1.94±0.06
Understanding level	1.751	0.082	1.94±0.09	1.77±0.05
Knowledge	-2.491	0.014*	2.38±0.19	2.98±0.14
Choice without facilities	-0.157	0.876	1.74±0.13	1.77±0.10
Impact of poor facilities	1.650	0.101	1.66±0.11	1.45±0.07

Significant effects are indicated by asterisks: \* $p \leq 0.05$ .

The respondents from different source areas only have significant differences in environmental perception, and the respondents from urban areas have significantly better views on the current environmental situation than those from rural areas. In terms of the awareness of waste classification, including the understanding of waste classification, there is little difference between the two. Similar to the influence of gender, in the aspect of waste classification behavior, they are affected by waste classification facilities to a similar degree.

*Table 2. Results of independent sample t-test on the difference of waste classification awareness and behavior between different source area.*

	t	p	Source area	
			Urban	Village
Environmental perception	-2.483	0.014*	2.09±0.08	1.87±0.05
Understanding level	-0.944	0.347	1.89±0.09	1.80±0.05
Knowledge	0.352	0.726	2.71±0.20	2.80±0.14
Choice without facilities	-0.356	0.722	1.8±0.13	1.74±0.10
Impact of poor facilities	0.130	0.897	1.51±0.12	1.53±0.07

Significant effects are indicated by asterisks: \* $p \leq 0.05$ .

Different monthly living expenses and ages have no significant effect on College Students' awareness, cognition and behavior of waste classification. The homogeneity of campus life weakens the influence of these two factors on College Students' consciousness and behavior.

*Table 3. Results of One-way-ANOVA for different consumption levels and ages on the awareness and behavior of waste classification.*

	Monthly living expense		Age	
	F	p	F	p
Environmental perception	1.159	0.332	2.591	0.056
Understanding level	0.459	0.766	1.208	0.309
Knowledge	0.035	0.998	0.129	0.943
Choice without facilities	1.647	0.166	2.563	0.058
Impact of poor facilities	0.312	0.87	0.907	0.439

**4. Conclusions**

At present, college students generally have a high degree of recognition of waste classification awareness, and a strong waste classification awareness. At the same time, the respondents generally believe that waste classification is the

obligation of residents, and citizens should take the responsibility of waste classification. Colleges and universities should also increase the publicity to improve citizens' awareness of waste classification.

Through this investigation and research, we can draw conclusions from the following aspects:

(1) Waste classification awareness. It can be seen from the survey that 94.78% of college students have a high level of understanding of waste classification, a strong sense of waste classification, and generally agree with the waste classification model.

(2) Waste classification behavior. It can be concluded that college students' understanding of waste classification behavior is at a high level, and the cognitive choice rate of waste classification is over 52%.

(3) Waste classification awareness and behavior. However, there is still a certain gap in the implementation of waste classification among college students, and their awareness and behavior of waste classification are biased. For waste classification, a small number of college students tend to have a high degree of recognition in awareness, but cannot show it in behavior. In addition, many college students have the awareness of waste classification, but it cannot be realized because of objective factors. 60.45% of the respondents will be affected by the status of waste disposal facilities. Therefore, colleges and universities still need to strengthen the publicity and promotion of waste classification awareness, and some related supporting facilities and management should also be in place.

Compared with ordinary residents, college students can learn and understand new knowledge faster. Therefore, it is necessary to strengthen the college students' cognition of waste classification, so that they can achieve the unity of knowledge and practice, so as to promote the waste classification behavior of other residents and implement the waste classification in the public life. At the same time, we should strengthen the publicity of the media, and vigorously promote and implement waste classification. Through the leading role of college students, promote the implementation of waste classification, reduce environmental pollution, so as to promote the sustainable development of society.

## Author Contributions

The Manuscript was written through contributions of all authors. All authors have given approval to the final version of the manuscript.

## Conflicts of Interest

The authors declare that they have no competing interests.

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