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How Socio-Demographic Traits and Moderating Variables Shape Waste Clothing Recycling in China

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Abstract

As living standards rise, the proliferation of discarded apparel contributes significantly to environmental pollution through traditional disposal methods, underscoring the importance of sustainable recycling practices in promoting a green lifestyle. This research examines factors influencing waste clothing recycling among Chinese residents, based on 1220 survey responses. It employs the entropy weight method to quantify dependent and moderating variables, followed by ordinary least squares regression analysis. The results indicate that (1) socio-demographic characteristics (notably gender, with females demonstrating higher recycling rates) and clothing disposal behaviors (including recycling knowledge, frequency of new clothing acquisition, usage duration, and disposal practices) markedly impact recycling activity, whereas age, geographic region, and income levels exhibit no significant effects. (2) Objective environmental conditions (such as recycling infrastructure and policy incentives) and recycling mode (formal outlets and donation platforms) positively moderate the relationship between key factors and recycling volume. These findings suggest that enhancing waste apparel recycling necessitates comprehensive strategies encompassing knowledge dissemination, environmental optimization, and diversification of recycling modalities—providing valuable insights for advancing circular economy initiatives and sustainable waste management within the apparel industry.

Keywords: waste clothing recycling; green development; low-carbon economy; sustainability

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1. Introduction

The United Nations' 2030 Agenda for Sustainable Development, with 17 Sustainable Development Goals (SDGs) as its core, aims to address global challenges like environmental degradation and unsustainable consumption [1]. China has integrated these SDGs into national strategies—issuing the National Plan for Implementing the 2030 Agenda for Sustainable Development to advance goals such as SDG 12 (Responsible Consumption and Production) via circular economy policies and SDG 13 (Climate Action) through "dual carbon" commitments [2]. As one of the world's largest carbon emitters [3], China is implementing more powerful policies and measures to actively respond to climate change and carbon emission reduction [4,5], striving to peak carbon dioxide emissions by 2030 and achieve carbon neutrality by 2060 [6].

With the rapid development of China's economy, per capita disposable income has increased steadily year by year. After meeting basic living needs, people's demand for material possessions has grown [7]. In terms of clothing, requirements are no longer limited

to warmth but are more inclined to pursuing fashion and comfort, which accelerates the speed of clothing upgrades [8,9]. In 2018, the turnover of China's clothing industry reached USD 1042.84 billion, resulting in approximately 3.1 billion pieces of discarded clothing annually [10]. Although this figure primarily reflects the industry's export-oriented growth, the massive production scale indirectly intensifies domestic waste generation—making consumers' recycling behavior a critical aspect of mitigating environmental pressure and highlighting the urgent need for circular economy policies that engage both producers and consumers in reducing textile waste. Unsustainable treatment of waste clothes has caused significant resource waste and carbon dioxide emissions [11,12], which is inconsistent with promoting a green, low-carbon economic and social future [7,13]. Therefore, how to effectively recycle and handle large quantities of waste clothes is an important and urgent issue for current social development. Reducing the waste of natural resources and carbon emissions from waste clothing disposal is crucial for China to achieve its carbon neutrality goal.

The Chinese government is committed to green development, promoting the harmonious coexistence between humankind and nature, and accelerating the construction of waste recycling systems [7,9,14]. Promoting green and low-carbon economic and social development is the key link to achieving high-quality development in China [15,16]. Waste clothing can be transformed into various recycled products through secondary production technologies. Recycling 1 kg of waste clothing can reduce carbon dioxide emissions by 3.6 kg, save 6000 L of industrial water, and reduce the use of 0.3 kg of chemical fertilizers and 0.2 kg of pesticides [13,17]. It is evident that the recycling process of waste clothing holds significant potential for energy conservation and emission reduction [18,19]. This study explores the economic benefits of the waste clothing export trade and conducts an in-depth analysis of the sustainability of waste clothing treatment paths, which is of great significance for achieving sustainable development and carbon neutrality. This research on waste clothing recycling directly aligns with SDG 12: improving recycling efficiency reduces reliance on virgin textile materials and promotes the "3R" principle. It also supports SDG 13 by cutting carbon emissions (3.6 kg CO_2 reduced per 1 kg of recycled clothing) and aids SDG 15 (Life on Land) by lowering landfill-related soil pollution [1,2,20].

At present, relevant research mainly focuses on the "recycling and reuse" mechanism of waste clothing, as well as the economic, policy, and environmental factors that affect residents' waste clothing recycling behavior; there is little systematic analysis of the recycling mechanism from the micro-level (residents') perspective [21,22]. This study contributes to this field by enriching its content, specifically as follows: unlike previous single-factor analyses, it innovatively integrates three core dimensions—socio-demographic traits (e.g., gender, income), clothing usage factors (e.g., new clothing wear duration, annual obsolete clothing quantity), and dual-dimensional moderating variables (e.g., recycling mode, residents' recycling understanding)—into a unified research framework, enabling a holistic examination of residents' recycling behavior. A key new perspective lies in its micro-level focus: instead of treating residents as a homogeneous group, it empirically explores how individual differences in traits and usage habits interact with external conditions and internal cognition to shape recycling participation. This is supplemented by rigorous methodological innovations, such as using the entropy weight method to objectively calculate the weights of dependent and moderating variables (avoiding subjective artificial weight assignment in prior studies) and applying a multi-linear regression model to analyze 1220 valid questionnaire responses. This elucidation of complex interrelations enhances the conceptual framework of waste apparel recycling research by demonstrating how the recycling mode and residents' environmental cognition substantially affect participation rates. Consequently, this investigation bridges micro-level behavioral insights with

China's Sustainable Development Goal (SDG) strategies, offering empirical validation for the optimization of recycling infrastructures and advancing concrete progress toward key SDG targets.

The remaining sections of this manuscript are structured as follows. Section 2 provides the theoretical framework and conceptual model. Section 3 details the data sources and analytical methodologies, including min–max normalization, entropy weight method, Ordinary Least Squares (OLS) regression analysis, and interaction effect modeling. Section 4 reports the empirical findings, encompassing model diagnostics (VIF, White's test for heteroscedasticity, Durbin–Watson test for autocorrelation), baseline regressions, moderation effects, and robustness checks. Section 5 synthesizes the key determinants influencing waste textile recycling behavior. Section 6 offers policy implications aimed at enhancing recycling incentives and sustainable development initiatives.

2. Theoretical Analysis and Research Framework

2.1. Theoretical Analysis on Economic Externality of Waste Clothing

Before analyzing the economic externality of waste clothing, the current disposal path of waste clothing in China is presented in Figure 1 [8–10].

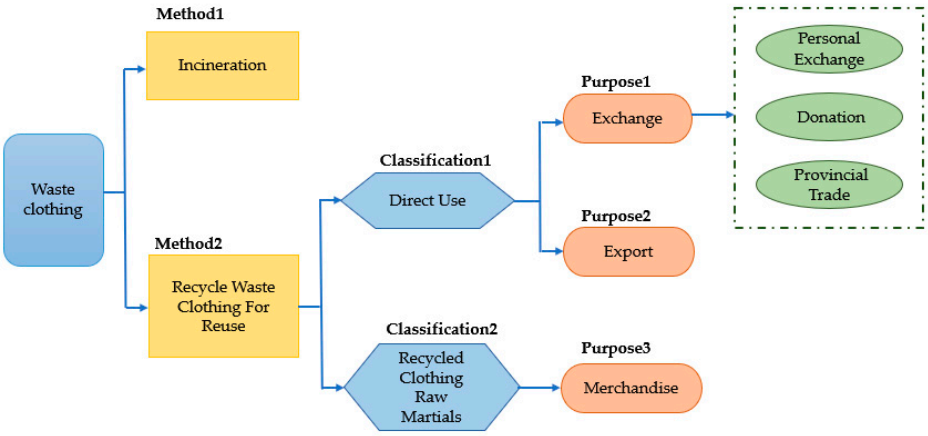

Figure 1. Schematic diagram of the waste clothing treatment mechanism.

According to Figure 1, there are two main ways to dispose of waste clothing in China currently. One is incineration, which produces harmful gases and brings negative externalities to the environment. By 2023, about 76% of waste clothing had not been recycled, it was disposed of mainly through incineration or landfill [23]. The second is to recycle waste clothing for reuse. According to the data of 2023, the annual output of waste textiles in China is about 23.34 million tons, the recycling volume is 5.5 million tons, and the recycling rate is about 23%. There are two ways of recycling: the first is trading. Most of China's waste clothing is basically exported to some developing countries in Asia and Africa; the surplus waste clothing is transferred to other poor Chinese areas. The second recycling method is to turn waste clothing into raw materials of clothes after certain technical treatments, and put them back into the production process. This method is not only high-cost, requiring energy consumption but also has high technical requirements. The economic benefit of USD 56–112 per ton of old clothes can be generated after recycling, which is mainly used for the production of recycled materials. Some residents choose to store old clothes at home or discard them directly due to inconvenient recycling channels or lack of awareness. Therefore, different disposal methods of waste clothing will bring different externalities. At present, China's main treatment method of waste clothing is export, which is the main reason for the significant positive external economic impacts. According to the Chinese Customs Statistics, from January to August

2023, the export volume of China's old clothing was about 300 million tons, with an export value of USD 3.6 billion, mainly sold to African countries, with a unit price of about USD 7.

If waste clothing is incinerated as ordinary waste, it will not only consume a large volume of coal or other power resources, but also produce a large number of toxic gases, which will directly destroy the ozone layer, resulting in negative externalities [24]. When negative externalities exist, MSC > MPC, and the difference between the two is MEC. According to welfare economics, MPC and MB determine the social demand production Q*; MPC and MB determine the private production Q1.

According to Figure 2, Q_1 is greater than Q*; if Q_1 is reduced to Q*, MPC must be increased [25]. Therefore, if negative externalities are not effectively corrected, it will also lead to errors in resource allocation [26]. Through the above analysis, by changing the treatment method for waste clothing, the method of burning waste clothing will be changed to export or reused as raw materials, which can not only correct the negative externalities but also increase social welfare benefits [27], as shown in Figure 3.

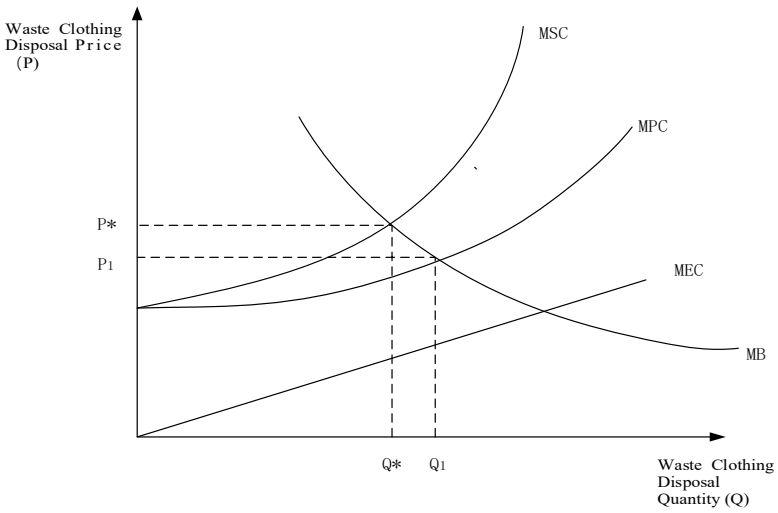

Figure 2. Schematic diagram of the relationship between the reuse of waste clothing and social welfare. Note: P = Price; Q = quantity; MSC = marginal social cost; MPC = marginal private cost; MEC = marginal environmental cost; MB = marginal benefit. ("P" to represent the price, and "P*" denotes the price at the intersection of the two lines.)

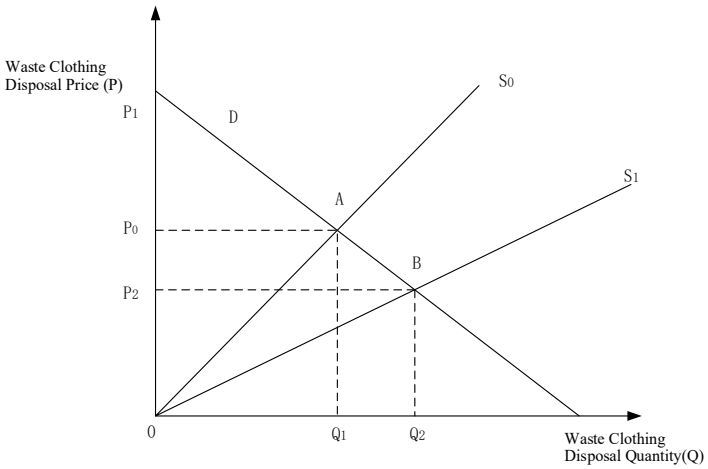

Figure 3. Schematic diagram of the relationship between the reuse of waste clothing and social welfare.

In Figure 3, under the assumption of no reuse of waste clothing, the supply curve of waste clothing products is curve S0, and the demand curve is D; at this time, the consumer

surplus is P0AP1 [25]. If waste clothing is reused as export products or reused as new raw materials in production, this process can greatly reduce the treatment cost of waste clothing; at this time, the price of waste clothing decreases, reducing the treatment cost, so that the supply curve drops to S1, and the treatment price of waste clothing also decreases, from P0 to P2, and the consumer surplus is P2BP1, an increase in P0ABP2. Similarly, from the perspective of producer surplus, the price reduction has changed the producer surplus from P0A0 to P2B0. Obviously, for the whole society, the increment of social welfare, that is, social surplus (the sum of consumer surplus and producer surplus), is △ABO > 0, which means that the reuse of waste clothing has generated income spillover (external benefits) and improved the welfare level of the whole society [28].

Clearly, the traditional model for handling discarded clothing has fallen into a vicious cycle of "problem proliferation and intensified negative externalities." To break this impasse, a new solution must be built by addressing residents' recycling behaviors. The following diagram clearly illustrates how residents can proactively engage in sorting, directing distribution, and recycling activities for used clothing. By tackling the root causes of the problem, this approach ultimately aims to correct negative externalities and advance sustainable development, providing a practical logical framework for transforming used clothing management [1,2,20].

As shown in Figure 4. In the field of used clothing disposal, the absence of proper handling methods can trigger a series of serious problems. From an environmental perspective, incinerating used clothing causes pollution by releasing harmful gases that degrade air quality. From a resource standpoint, vast quantities of old garments lie idle or are discarded, resulting in severe resource wastage—these reusable textile resources are consumed needlessly. Simultaneously, the continuous accumulation of discarded clothing contributes to waste buildup, placing immense pressure on urban waste management systems [29].

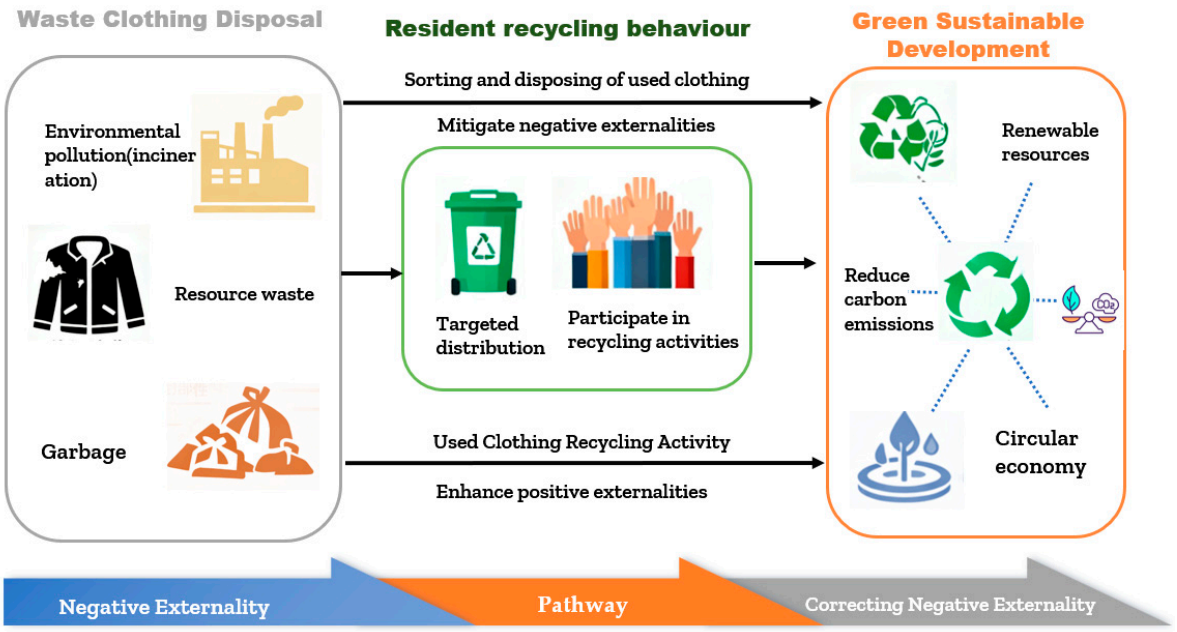

Figure 4. Residents' recycling behavior drives the correction of negative externalities: a "problem–path–purpose" logic diagram.

To address these challenges, residents' recycling practices become a critical pathway. Surveying residents' approaches to used clothing disposal and recycling behavior facilitates the sorting, targeted allocation, and recycling of these items. This ensures different types of used garment flow into appropriate processing or reuse channels, enabling precise

resource allocation. Such practices not only mitigate negative externalities—reducing pollution, resource waste, and garbage accumulation—but also amplify positive externalities, expanding the beneficial effects of used clothing recycling and fostering a virtuous cycle.

Through residents' recycling actions, the objective of mitigating environmental externalities can be achieved. Recycled used clothing transforms into renewable resources, reducing reliance on new raw materials. The recycling process replaces high-carbon incineration and reduces the need for new garment production, effectively cutting carbon emissions and supporting the "dual carbon" goals. More importantly, the recycling, processing, and reuse of used clothing form a complete closed-loop system, effectively advancing the circular economy. This logical chain—from "Negative Externality" to "Pathway" to "Correcting Negative Externality"—clearly demonstrates the critical value of resident participation in used clothing recycling for addressing resource and environmental challenges and promoting sustainable development. Ultimately, this provides clear actionable guidance for building a green, circular used clothing management system.

2.2. Research Framework of Recycling and Utilization of Residents' Waste Clothing

The research framework of factors affecting the recycling of residents' waste clothing is shown in Figure 5:

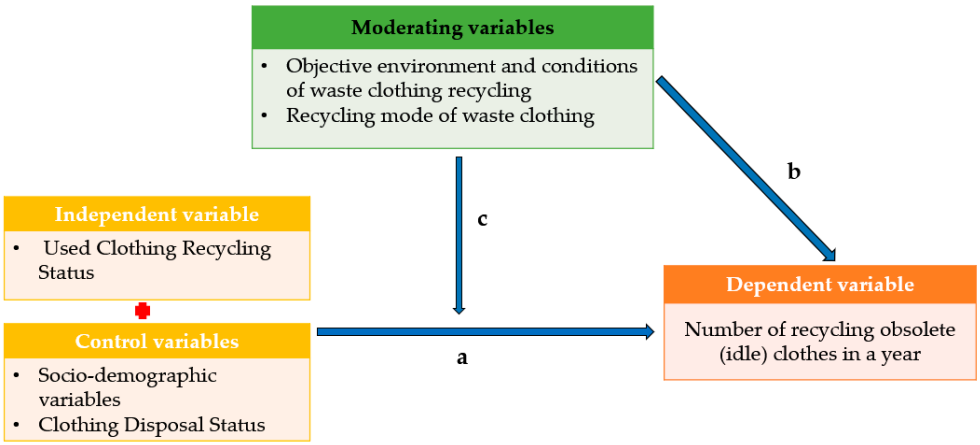

Figure 5. Research framework of recycling and utilization of residents' waste clothing. Note: a, b, c represent the corresponding coefficients.

This diagram outlines a research framework for waste clothing recycling behavior, showing variable relationships hierarchically. The independent variable is "Used Clothing Recycling Status". Control variables include "Socio-demographic variables" and "Clothing Disposal Status". Moderating variables are "Objective environment and conditions of waste clothing recycling" and "Recycling mode of waste clothing". The dependent variable is Number of recycling obsolete (idle) clothes in a year. Arrow "a" denotes the direct effect of independent and control variables on the dependent variable, while arrows "c" and "b" illustrate how moderating variables regulate this relationship, clarifying the mechanism for subsequent empirical analysis. Based on existing literature and theoretical analysis, this study proposes the following working hypotheses:

Hypothesis H1. Some socio-demographic traits and clothing disposal status have a significant impact on Number of recycling obsolete (idle) clothes in a year.

Hypothesis H2. Moderating Variables—Objective environment and conditions of waste clothing recycling play a positive regulatory role. Better objective environment and conditions of waste clothing recycling (such as accessible recycling agencies) and more diverse

recycling modes can strengthen the positive correlation between core influencing factors and recycling participation.

Hypothesis H3. Moderating Variables—Recycling mode of waste clothing play a positive regulatory role. Reduced frequency of new clothing purchases and higher residents' understanding of waste clothing recycling can enhance the positive impact of key factors on recycling participation, and the interaction between these two variables further promotes recycling behavior.

This study will verify the above hypotheses through questionnaire data analysis, aiming to provide a reliable theoretical and empirical basis for solving China's waste clothing recycling problem. Based on these, we put forward targeted policy suggestions to promote environmental protection and improve resource utilization, thereby realizing a green and low-carbon lifestyle [21].

3. Research Data and Model

3.1. Research Data

This article analyses the influencing factors of residents' waste clothing recycling through a questionnaire. The questionnaire establishes panel data of multiple regions, multiple research perspectives and multiple age groups [30]. This expands the scope of the research subject's environment and personal factors. A total of 1220 questionnaires were distributed and 1200 valid questionnaires were collected. The effective participation rate of the questionnaire was 98.361% (see Appendix A, Table A1 for details.). For details on the indicator variables, see Table 1.

3.2. Research Model

3.2.1. Data Standards

In order to eliminate the influence of different units of each index in the process of using the entropy weight method, this study uses the min–max standardization method to process the data. Suppose k numbers of indicators X_1, X_2, …, X_k are given, where $X_i = \{x_1, x_2, \ldots, x_k\}$. The standardized value of each index data is Y_1, $Y_2, \ldots, Y_K$. So Y_{li} is the standardized data row of index i in the l year [31,32], and its formula is as follows:

Standardization of positive indicators:

$$y_{\theta ij} = \frac{x_{\theta ij} - min\left(x_{\theta ij}\right)}{max\left(x_{\theta ij}\right) - min\left(x_{\theta ij}\right)} \tag{1}$$

Standardization of negative indicators:

$$y_{\theta ij} = \frac{max\left(x_{\theta ij}\right) - x_{\theta ij}}{max\left(x_{\theta ij}\right) - min\left(x_{\theta ij}\right)} \tag{2}$$

where $y_{\theta ij}$ is the jth index value of province i in the θ_{th} year; max represents the maximum value of an indicator, and min represents the minimum value of an indicator.

3.2.2. Entropy Weight Method

The entropy weighting method assigns weights solely based on the variability of indicator data, with greater data variation yielding higher weights. It involves no artificial assumptions, accurately reflecting the independent importance of individual indicators. It does not require correlations between indicators, and even multicollinearity does not

affect the results. Therefore, this paper employs the entropy weighting method to calculate indicator weights [33,34].

Table 1. Selection of impact indicators affecting residents' waste clothing recycling.

Variable	Indicator		Sub-Indicator
Dependent variable	Number of recycling obsolete (idle) clothes in a year		
Independent variable	Residents' understanding of waste clothing recycling		Which of the following types of institutions are you willing to have handle your waste clothes?
			If there are professionals responsible for recycling, are you willing to recycle your old clothes?
			Are you willing to sell your idle clothes if there are enterprises, institutions or sites for paid recycling of waste clothes nearby?
			What do you think is the reason for the low rate of clothing recycling?
			In which way do you want to dispose of waste clothes?
			If your school or community set up a waste clothing recycling station, what would be your level of support?
Control variables	Socio-demographic variables	Gender	
		Age	
		Region	
		City type	
		Monthly household income	
		Occupation	
		Quality or style when buying clothes	
	Clothing Disposal Status	When to buy new clothes	
		The average number of new clothes purchased every three months	
		Usage time of new clothes	
		Clothing obsolescence	
		Average age of obsolete clothes	
		General treatment (disposal methods) of obsolete clothes	
Moderating variables	Objective environment and conditions of waste clothing recycling		Any classified recycling agency or organization around your home
			The necessity of recycling old clothes
			Groups that play an important role in the recycling of waste clothing
			Recycling route
			Disposal methods of waste clothes after recycling
	Recycling mode of waste clothing		Recycling mode of waste clothing
			Willing to buy goods transformed from waste clothes (cleaned and disinfected)
			Acceptance of secondary items of old clothes transformation
			Concerns about the recycling of waste clothing

The entropy weight method is to determine the objective weight according to the index variability. The smaller the information entropy E_j of an index, the greater the degree of variation in the index value, the more information it provides, the greater its role in the comprehensive evaluation, and the greater its weight [33,34]. The entropy weight method

is used to calculate the weight of each evaluation index. In the model, if the entropy of the ith index is E_j, the E_j calculation formula is as follows:

$$E_j = -ln(n)^{-1} \sum_{i=1}^{n} p_{li} ln p_{li} \tag{3}$$

where $P_{li} = \frac{Y_{li}}{\sum_{j=1}^{n} Y_{li}}$. If $P_{li} = 0$, then define $\lim_{P_{li} \to o} P_{li} ln P_{li} = 0$. According to the calculation formula of information entropy, the information entropy of each index is calculated as $E_1, E_2, \ldots, E_k$. The weight of each index is calculated by the method of information entropy. The weight formula is as follows:

$$W_i = \frac{1 - E_j}{k - \sum_{j=1}^{k} E_j} (i = 1, 2, 3 \ldots k) \tag{4}$$

We calculated the independent variable and moderator variable using the entropy weight method (see Appendix A, Table A2 for details).

3.2.3. OLS Regression Model

Regression analysis is generally used to study the linear correlation between dependent variables and two or more independent variables. The mathematical formula representing the linear relationship of multiple variables is called the multilinear regression model [35,36], and the formula is as follows:

$$y = b_0 + b_1 x_1 + b_2 x_2 + b_3 x_3 + \cdots + b_n x_n + \varepsilon i \tag{5}$$

where b_1 to b_n are the parameters of variable x, and the regression parameters are estimated by the least square method; by comparing the size of the parameters, we can obtain the order of the influence degree of the independent variables x_1, x_2, $x_3 \ldots$, x_n on the dependent variable y, that is, the greater the influence of the independent variable x_n on y, the greater the corresponding parameter b_n, and vice versa.

3.2.4. Moderating Model

To test whether maternity Variable (Objective environment and conditions of waste clothing recycling) and (recycling mode of waste clothing) have moderating effects, a moderation model is constructed [37].

$$Y = \beta_0 + \beta_1 X + \beta_2 M + \varepsilon \tag{6}$$

$$Y = \beta_0 + \beta_1 X + \beta_2 M + \beta_3 XM + \varepsilon \tag{7}$$

where Y is the dependent variable, X is the independent variable, M is the moderating variable, and XM is the interaction term. Variables X and M were mean-centered (subtracting the sample mean from the variable) before creating the interaction term. A significant interaction coefficient (β_3) indicates a moderating effect.

4. Empirical Analysis

4.1. Model Verification

For this study, we employed OLS regression. Prior to regression analysis, we conducted VIF tests, White tests, and Durbin tests. The VIF test aims to diagnose multicollinearity within the multiple regression model, preventing it from interfering with the estimation accuracy of regression coefficients and the results of significance tests [38]. The results are shown in Table 2.

Table 2. VIF Test.

Variable	VIF
Residents' understanding of waste clothing recycling	1.301
Gender	1.011
Age	1.009
Region	1.011
City type	1.015
Monthly household income	1.007
Occupation	1.014
Quality or style when buying clothes	1.016
When to buy new clothes	1.011
The average number of new clothes purchased every three months	1.011
Usage time of new clothes	1.013
Clothing obsolescence	1.006
Average age of obsolete clothes	1.009
General treatment (disposal methods) of obsolete clothes	1.010
Objective environment and conditions of waste clothing recycling—moderating variable	1.011
Recycling mode of waste clothing—moderating variable	1.103

The results of the analysis indicate that the VIF values for all indicators are less than 10. This confirms that there is no multicollinearity.

The White test examines whether the error terms in the regression model exhibit heteroscedasticity, ensuring the reliability of model standard errors and statistical inferences [39]. The results are shown in Table 3.

Table 3. White test.

Test	Value
Test Statistic	8.948
Test Statistic *p*-value	0.347
F-Statistic	1.118
F-Test *p*-value	0.348

In statistics, a significance level of $\alpha = 0.05$ is typically chosen to determine whether to reject the null hypothesis. The null hypothesis for White's heteroscedasticity test is that the error terms in the regression model are homoscedastic. When the *p*-value exceeds α, we accept the null hypothesis; when the *p*-value falls below α, we reject the null hypothesis. In this test, both the *p*-value for the Test Statistic and the *p*-value for the F-Test are greater than 0.05 (0.347 and 0.348, respectively). Therefore, we accept the null hypothesis, concluding that the error terms in the regression model exhibit homoscedasticity and no significant heteroscedasticity exists. This indicates that the constructed linear regression model exhibits good variance stability, making the estimation results and statistical inferences derived from this model relatively reliable.

The Durbin–Watson test assesses whether the residuals in the regression model (particularly for time series or ordered cross-sectional data models) display first-order autocorrelation, preventing standard errors from being underestimated or overestimated due to autocorrelation [40]. The results are shown in Table 4.

Table 4. Durbin–Watson test.

Test	Value
DW Test	1.928

The value of the Durbin–Watson Test Statistic is 1.928. The Durbin–Watson Test Statistic ranges from 0 to 4. Generally, when the statistic approaches 2, it indicates no autocorrelation in the model residuals; values below 2 suggest possible positive autocorrelation; values above 2 indicate possible negative autocorrelation. In practical applications, values between 1.5 and 2.5 are typically considered to mean no significant autocorrelation in the residuals. In this test, the statistic of 1.928 falls within the 1.5 to 2.5 range. Therefore, we can conclude that the residuals of this regression model exhibit no significant autocorrelation. This indicates that the linear regression model we constructed performs well in terms of residual independence, and statistical inferences and predictions based on this model possess high reliability.

4.2. Benchmark Regression

Based on the questionnaire data, this study uses Stata 18 to conduct basic regression analysis. The literature indicates that the significance of order probit and OLS models is consistent. Therefore, this paper only performs OLS regression [41,42], with the results shown in Table 5:

Table 5. Benchmark regression analysis.

Indicators	Results
Residents' understanding of waste clothing recycling	0.210 0.032 **
Gender	0.17 0.013 **
Age	−0.001 0.103
Region	0.081 0.188
City type	0.081 0.310
Monthly household income	0.052 0.481
Occupation	0.041 0.351
Quality or style when buying clothes	−0.022 0.903
When to buy new clothes	−0.041 0.032 **
The average number of new clothes purchased every three months	0.081 0.621
Usage time of new clothes	0.057 0.014 **
Clothing obsolescence	0.011 0.119 **
Average age of obsolete clothes	−0.139 0.068 *
General treatment (disposal methods) of obsolete clothes	0.004 0.051 **
Constant	4.836 0.000 ***
Observations	1220
R^2	0.686

Note: ***, **, * represent 1%, 5% and 10% significance levels, respectively.

To analyze the factors influencing the Number of recycling obsolete (idle) clothes in a year, we interpret the regression results as follows:

4.2.1. Significant Influencing Factors

Residents' understanding of waste clothing recycling: A higher level of understanding significantly promotes residents' recycling of obsolete idle clothes. This indicates that enhanced knowledge about recycling mechanisms directly motivates residents to participate in recycling behaviors. Gender: Females exhibit a significantly higher tendency to recycle obsolete/idle clothes than males. This aligns with gender differences in environmental awareness and clothing management habits—females are often more proactive in organizing and disposing of unused items through recycling channels. When to buy new clothes: Residents who purchase new clothes more frequently (e.g., following fashion trends) are more likely to recycle obsolete/idle clothes. Frequent new purchases lead to more obsolete items, and proactive residents tend to recycle these items promptly rather than letting them idle. The average number of new clothes purchased every three months: A higher frequency of new clothing purchases correlates with more recycling of obsolete/idle clothes. This reflects a "consumption–recycling" linkage—more new clothes mean more obsolete items, and residents with regular purchasing habits are also more likely to adopt structured recycling practices. Usage time of new clothes: Longer usage time of new clothes positively affects recycling behavior. This may be because residents who value the durability of clothes also prioritize responsible disposal, opting to recycle rather than discard items that have been used for extended periods. General treatment (disposal methods) of obsolete clothes: Specific disposal habits (e.g., relying on formal recycling channels or donation platforms) significantly boost the recycling of obsolete/idle clothes. This highlights that structured disposal practices—rather than random discarding—are key to increasing recycling rates.

4.2.2. Non-Significant Influencing Factors

Variables such as Age, Region, City type, Monthly household income, Occupation, Quality or style when buying clothes, Clothing obsolescence, Number of obsolete (idle) clothes in a year, and Average age of obsolete clothes show no significant impact. This suggests that demographic background, clothing consumption preferences (quality/style), and the mere quantity/age of obsolete items do not directly drive recycling behavior. Instead, cognitive factors, consumption habits (purchase frequency, usage time), and behavioral norms (disposal methods) are the dominant drivers.

The regression results confirm the validity of Hypothesis H1. Among the sociodemographic characteristics mentioned in H1, gender emerged as a significant influencing factor, with women exhibiting a significantly higher tendency to recycle obsolescence clothing than men. When to buy new clothes, Usage time of new clothes, clothing obsolescence and general treatment (disposal methods) of obsolete clothes also significantly increased recycling volumes. Both findings align with H1′s statement that "certain sociodemographic characteristics and clothing disposal practices exert a significant influence," thereby establishing the validity of H1.

4.3. Moderating Effect

On the basis of benchmark regression, this study explores the impact on the Number of obsolete (idle) clothes in a year through the introduction of moderating variables (Figure 5).

4.3.1. Moderating Effect—Objective Environment and Conditions of Waste Clothing Recycling

On the basis of the above calculation of moderating variables, the moderating variables are added to the basic regression to study the influencing factors of Number of recycling obsolete (idle) clothes in a year. The results are shown in Table 6.

Table 6. Analysis of moderating effect—Objective Environment and Conditions of Waste Clothing Recycling.

Indicators	Model 1	Model 2	Model 3
Residents' understanding of waste clothing recycling	0.210 0.032 **	0.783 0.015 *	0.859 0.009 *
Objective environment and conditions of waste clothing recycling		0.871 0.013 *	0.550 0.021 **
Residents' understanding of waste clothing recycling × Objective environment and conditions of waste clothing recycling			0.140 0.043 **
Control variables	YES	YES	YES
Constant	0.740 0.000 ***	0.768 0.000 ***	0.385 0.000 ***
Observations	1220	1220	1220
R^2	0.673	0.724	0.721

Note: ***, **, * represent 1%, 5% and 10% significance levels, respectively.

The increases from 0.673 (Model 1) to 0.724 (Model 2) and 0.721 (Model 3), indicating that incorporating the moderating variable and its interaction term enhances the model's explanatory power. This confirms that both "cognitive factors" (recycling understanding) and "external conditions" (objective environment) are critical to explaining residents' recycling of obsolete/idle clothes, and their interaction further enriches the theoretical framework.

Model 1 (Core Independent Variable): Residents' understanding of waste clothing recycling" exhibits a significant positive effect, confirming that higher recycling knowledge directly promotes residents' recycling of obsolete/idle clothes. This aligns with the logic that enhanced awareness of recycling processes and benefits motivates proactive participation. Model 2 (Incorporating Moderating Variable): Both Residents' understanding of waste clothing recycling and Objective environment and conditions of waste clothing recycling show significant positive effects. This indicates that besides cognitive factors, external conditions (e.g., accessibility of recycling facilities, policy support) also independently drive recycling behavior—better infrastructure reduces participation barriers, encouraging more residents to recycle. Model 3 (Including Interaction Term): The interaction term "Residents' understanding of waste clothing recycling × Objective environment and conditions of waste clothing recycling is significantly positive. This reveals a synergistic moderating effect: when residents have strong recycling knowledge and face favorable external conditions (e.g., abundant recycling bins, clear policy guidance), their recycling behavior is amplified. Meanwhile, the direct effects of the two main variables remain significant but weaken slightly, suggesting the interaction term captures part of their joint influence.

This conclusion not only validates the document's research hypothesis H3, but also provides theoretical grounding for policy formulation—promoting used clothing recycling requires simultaneously strengthening "cognitive advocacy" (reducing information costs) and "environmental infrastructure" (reducing transaction costs). Only through their synergy can resident recycling participation rates be maximized, ultimately achieving green, low-carbon goals and optimized resource utilization.

4.3.2. Moderating Effect—Recycling Mode of Waste Clothing

On the basis of regression, this study introduces the Recycling mode of waste clothing as moderating variables, and continues to analyze the following moderating effects. The regression results are shown in Table 7.

Table 7. Analysis of moderating effect—Recycling Mode of Waste Clothing.

Indicators	Model 1	Model 2	Model 3
Residents' understanding of waste clothing recycling	0.210 0.032 **	0.561 0.017 **	0.677 0.016 *
Recycling mode of waste clothing		1.822 0.000 ***	1.671 0.000 ***
Residents' understanding of waste clothing recycling × Recycling mode of waste clothing			0.350 0.024 **
Control variables	YES	YES	YES
Constant term	0.392 0.000 ***	−0.162 0.000 ***	−0.096 0.000 ***
Observations	1220	1220	1220
R^2	0.653	0.741	0.692

Note: ***, **, * represent 1%, 5% and 10% significance levels, respectively.

The increases from 0.653 (Model 1) to 0.741 (Model 2) and 0.692 (Model 3), demonstrating that incorporating the moderating variable and its interaction term enhances the model's explanatory power. This confirms that "cognitive factors" (recycling understanding) and "behavioral channels" (recycling mode) are both critical to explaining residents' recycling of obsolete/idle clothes, and their interaction enriches the theoretical framework by capturing how knowledge and practice reinforce each other.

Model 1 (Core Independent Variable) serves as the baseline model and aligns with the aforementioned content; further elaboration is omitted here. Model 2 (Incorporating Moderating Variable): Both Residents' understanding of waste clothing recycling and Recycling mode of waste clothing exert significant positive impacts. This suggests that besides cognitive factors, the way residents recycle (e.g., using formal recycling platforms, participating in donation drives, or relying on community recycling programs) is a critical driver—structured and accessible recycling modes reduce barriers to participation, encouraging more frequent recycling. Model 3 (Including Interaction Term): The interaction term Residents' understanding of waste clothing recycling * Recycling mode of waste clothing is significantly positive. This reveals a synergistic moderating effect: when residents have strong recycling knowledge and engage in effective recycling modes (e.g., knowing how to recycle and using convenient channels), their recycling behavior is amplified.

Synthesizing the results of the three models with theoretical analysis reveals that the moderating effect on residents' used clothing recycling behavior fundamentally stems from the combined economic mechanisms of "internal cognition reducing decision costs and external models lowering implementation costs": cognition alone (Model 1) can drive recycling behavior, but a "threshold for converting cognition into action" persists; adding recycling patterns (Model 2) lowers this conversion threshold and increases behavioral willingness; the synergy between cognition and patterns (Model 3) further breaks down the threshold, achieving a "1 + 1 > 2" effect. This conclusion not only validates the research hypothesis H3 presented in the document but also provides a theoretical basis for policy formulation—to advance used clothing recycling, it is necessary to simultaneously strengthen "cognitive advocacy" (e.g., government science communication on recycling's environmental value) and "model innovation" (e.g., enterprises establishing convenient recycling platforms). Only through their synergy can resident participation rates be maxi-

mized, ultimately contributing to the realization of the "dual carbon" goals and a green, low-carbon lifestyle.

4.4. Robustness Test

This paper conducts a robustness test on the benchmark regression results by replacing the dependent variable. We substitute the Residents' understanding of waste clothing recycling from the preceding section with Willingness to recycle to examine whether the conclusions remain robust after replacing the independent variable with Residents' understanding of waste clothing recycling.

The results are shown in Table 8. After replacing the dependent variable, the coefficient for Willingness to recycle is 0.341 and passes the significance test at the 1% confidence level. Before replacing the dependent variable, the coefficient for Residents' understanding of waste clothing recycling is 0.210 and passes the significance test at the 5% confidence level. Compared to the benchmark regression results, the estimated coefficient magnitude and significance show slight deviations, but the direction of influence remains consistent with the pre-replacement results. This confirms the robustness of the benchmark regression findings.

Table 8. Robustness test.

Indicators	Results
Willingness to recycle	0.341 0.047 ***
Control variables	YES
Constant	5.124 0.000 ***
Observations	1220
R^2	0.781

Note: ***, **, * represent 1%, 5% and 10% significance levels, respectively.

5. Conclusions

This study empirically explores the influencing factors and mechanism of residents' waste clothing recycling behavior, focusing on the Number of recycled obsolete (idle) clothes in a year. Based on the regression results and theoretical analysis, the conclusions are drawn as follows.

First, socio-demographic traits and clothing disposal status factors are critical predictors of waste clothing recycling behavior. Specifically, gender (females recycle more), residents' understanding of waste clothing recycling, new clothing purchase frequency, usage time of new clothes, and general disposal methods of obsolete clothes all exert significant positive effects on the Number of recycled obsolete clothes. In contrast, factors such as age, region, city type, monthly household income, occupation, quality or style when buying clothes, clothing obsolescence tendency, and average age of obsolete clothes show no significant impact. This indicates that residents' recycling behavior is more driven by behavioral habits, cognitive factors, and disposal norms rather than demographic background or simple consumption scale.

Second, Objective environment and conditions of waste clothing recycling play significant moderating roles. The interaction analysis reveals that the objective environment and conditions of waste clothing recycling (e.g., accessibility of recycling facilities, policy support) positively moderate the relationship between core influencing factors (residents' recycling understanding, socio-demographic traits) and recycling behavior. Similarly, the Recycling mode of waste clothing (e.g., formal recycling platforms, donation channels)

also exerts a positive moderating effect, amplifying the impact of residents' recycling knowledge and clothing disposal status on recycling quantity. These findings suggest that external conditions and behavioral channels are crucial in enhancing the effectiveness of individual-level factors in promoting waste clothing recycling.

Third, from a practical perspective, to promote waste clothing recycling and advance the circular economy, efforts should be directed toward three aspects. First, strengthen the dissemination of waste clothing recycling knowledge through educational campaigns to improve residents' cognitive level. Second, optimize the objective environment for waste clothing recycling by increasing recycling facilities, improving policy support, and enhancing the service quality of recycling institutions. Third, diversify recycling modes to match different residents' preferences and needs, thereby maximizing the motivation for recycling.

In summary, this study enriches the theoretical framework of waste clothing recycling behavior by identifying the key influencing factors and their interactive mechanisms. The findings provide valuable insights for policymakers and practitioners to design targeted interventions, contributing to sustainable waste management and the development of a circular economy in the clothing sector.

6. Policy Recommendations

6.1. Establishing Gender-Differentiated Guidance Mechanisms by Emphasizing Women's Proactive Engagement

Women exhibit substantial initiative in the realm of used clothing recycling, offering a strategic prospect for the formulation of targeted policies. Governments can partner with entities such as the Women's Federation and community committees to initiate "Women-Led Green Recycling Projects." Governments can set up "Women's Recycling Service Stations" at community collection sites, where female volunteers offer guidance on clothing categorization and oversee recycling documentation. Capitalizing on women's principal role in household disposal decisions will enhance family involvement in used clothing recycling.

Simultaneously, acknowledging women's emphasis on garment esthetics and quality, "Women-Exclusive Recycling Incentive Schemes" can be implemented on second-hand clothing platforms. For example, female users recycling used clothing via the platform may be entitled to value-added services, such as styling consultations or upcycling guidance. Moreover, companies can collaborate with fashion brands to create "Recycling Charity Collaboration Lines." By transforming donated women's clothing into limited-edition items, a portion of the sales revenue can be allocated to support environmental initiatives. This strategy further fuels women's enthusiasm for recycling and fully leverages their leadership potential in used clothing recovery.

6.2. Refining Differentiated Recycling Services Through Demographic- and Region-Specific Targeted Measures

Bespoke strategies in accordance with demographic and regional features can be formulated. For high-income strata and inhabitants of first-tier cities (who demonstrate la-tent support albeit with a currently restricted influence), precedence can be accorded to the establishment of upscale second-hand clothing collection depots. Collaboration with luxury goods preservation services and premium commercial complexes to proffer personalized services, such as door-to-door retrieval and professional evaluations, can be conducted, thereby catering to their exigencies for convenience and service superiority. For low-income segments and residents in lower-tier markets, advocating the "recycling-for-daily-necessities" framework by instituting collection points within community confines and township bazaars can be executed. Inhabitants can barter used clothing for staples

including rice, flour, cooking oil, and daily essentials, thereby diminishing the thresh-old for participation.

At the regional echelon, first-tier cities ought to amplify the deployment of intelligent recycling apparatus, harnessing big data analytics to dissect inhabitants' recycling behaviors and strategically position collection points. Second- and third-tier cities should concentrate on enhancing community recycling infrastructures by instituting "recycling information registries" through neighborhood committees and orchestrating periodic centralized collection endeavors. Rural domains should integrate used clothing recycling into rural rejuvenation strategies by embedding it within rural environ–mental enhancement initiatives. Village collectives should take the helm in establishing recycling transfer stations that interface with urban recycling entities, thereby addressing the conundrum of insufficient rural recycling conduits and attaining comprehensive recycling outreach across both urban and rural expanses.

6.3. Strengthen Internal Cognitive Intervention: Enhance Recycling Motivation Through Education and Information Guidance

Residents' recycling consciousness constitutes a pivotal factor shaping recycling conduct, necessitating educational and informational measures to enhance comprehension. Educationally, knowledge pertaining to used clothing recycling into the national educational framework should be incorporated. This can include implementing "green clothing consumption" curricula in primary and secondary schools, nurturing youthful recycling awareness through case analyses and practical upcycling exercises. For adults, utilizing community educational institutions and corporate training venues to conduct seminars on "Used Clothing Recycling and Low-Carbon Lifestyles," inviting specialists to elucidate the environmental advantages and economic worth of recycling can be conducted.

For informational interventions, constructing an "online + offline" communication matrix can be performed: for online, this can be conducted through disseminating educational videos and recycling location search applications through short-video platforms and social media channels; for offline, this can be executed by affixing recycling posters on community notice boards and elevator advertising panels, delineating the comprehensive chain from "incineration perils $\rightarrow$ recycling procedures $\rightarrow$ regenerated products." Concurrently, instituting a "Recycling Participation Disclosure Mechanism" to publicly exhibit residents' recycling involvement and achievements within communities can be conducted. This cultivates a societal milieu where recycling is esteemed, propelling behavioral transformation through elevated consciousness.

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Institutional Review Board Statement: This study is waived for ethical review as the questionnaire only collects general information (such as behavioral attitudes, consumption preferences, etc.) and does not involve sensitive content (such as private data, religion, etc.) by Shanghai Dianji University.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Conflicts of Interest: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A

Table A1. Descriptive Statistics of Indicators.

Variable	Option Category	Subtotal	Proportion
Number of recycling obsolete (idle) clothes in a year	0–10 pieces	465	38.11
	10–30 pieces	258	21.15
	30–50 pieces	176	14.43
	50–70 pieces	132	10.82
	70–90 pieces	113	9.26
	Above 90 pieces	76	6.23
Gender	Male	435	35.66
	Female	785	64.34
Age	Under 18	0	0
	18–25 years old	187	15.33
	25–30 years old	361	29.59
	30–40 years old	540	44.26
	Over 40 years old	132	10.82
Region	Eastern China (11 provinces/municipalities including Beijing, Tianjin)	408	33.44
	Central China (9 provinces/municipalities including Shanxi, Inner Mongolia)	406	33.28
	Western China (10 provinces/municipalities including Sichuan, Guizhou)	406	33.28
City type	First-tier and New First-tier Cities	788	64.59
	Second and Third-tier Cities	317	25.98
	Others	115	9.43
Monthly household income	Below 5000	80	6.56
	5000–10,000	241	19.75
	15,000–20,000	713	58.44
	Above 20,000	186	15.25
Occupation	Professionals and Technicians	495	40.57
	Leaders of State Organs, Mass Organizations, Enterprises and Institutions	62	5.08
	Housewives/Househusbands	40	3.28
	New Media Practitioners	188	15.41
	Service Industry Workers	300	24.59
	Manual Laborers	69	5.66
	Students	0	0
	Others	66	5.41

Table A1. *Cont.*

Variable	Option Category	Subtotal	Proportion
Quality or style when buying clothes	Quality	322	26.39
	Style	898	73.61
When to buy new clothes	Less than 1 month	28	2.3
	Once a quarter	110	9.02
	Once every two quarters	290	23.77
	Once every three quarters	119	9.75
	Once a year or more	179	14.67
	Uncertain (buy when seeing favorite ones)	494	40.49
The average number of new clothes purchased every three months	1–5 pieces	1040	85.25
	5–10 pieces	166	13.61
	10–15 pieces	14	1.15
	Over 20 pieces	0	0
Usage time of new clothes	Within 1 year (including 1 year)	221	18.11
	1–2 years (including 2 years)	397	32.54
	Over 2 years	129	10.57
	Uncertain (random)	473	38.77
Clothing obsolescence	Damaged/Broken	576	47.21
	Worn-out	480	39.34
	Dislike the style	609	49.92
	Ill-fitting	524	42.95
	Too many clothes to wear	201	16.48
	Other reasons	70	5.74
Average age of obsolete clothes	20% new or below	738	60.49
	30–50% new	380	31.15
	50–70% new	48	3.93
	80% new or above	54	4.43
General treatment (disposal methods) of obsolete clothes	Directly discard	203	16.64
	Keep idle at home (long-term storage in wardrobe)	378	30.98
	Donate to charitable organizations	299	24.51
	Put in recycling bins or contact relevant agencies (e.g., Alipay Xianyu door-to-door recycling)	485	39.75
	Sell as waste	301	24.67
	DIY for personal use or gifting	121	9.92
	Give to relatives and friends	175	14.34
	Sell to second-hand stores	43	3.52
	Incinerate by oneself	48	3.93
	Crush into fillers (e.g., cotton wadding)	384	31.48

Table A1. *Cont.*

Variable	Option Category	Subtotal	Proportion
Which of the following types of institutions are you willing to have handle your waste clothes?	Pure public welfare donation institutions	615	50.41
	Organizations combining public welfare and commerce	391	32.05
	No preference	214	17.54
If there are professionals responsible for recycling, are you willing to recycle your old clothes?	Willing	896	73.44
	Unwilling	324	26.56
Are you willing to sell your idle clothes if there are enterprises, institutions or sites for paid recycling of waste clothes nearby?	Willing	782	64.10
	Unwilling	438	35.90
What do you think is the reason for the low rate of clothing recycling?	Lack of clothing recycling institutions, services and guidance	312	25.57
	Lack of awareness of recycling and reuse among people	391	32.05
	Unclear recycling channels	404	33.11
	Insufficient personal recycling awareness and motivation	391	32.05
	Insufficient implementation of government promotion guidelines	553	45.33
	Insufficient recycling education and promotion	318	26.07
	Other	44	3.61
Which way do you want to dispose of waste clothes?	Establish second-hand clothing markets	702	57.54
	Regular door-to-door recycling by professionals	543	44.51
	Self-delivery to recycling enterprises/sites	461	37.79
	Mailing to recycling enterprises/sites	715	58.61
If your school or community set up a waste clothing recycling station, what is your level of support?	Do not support	0	0.00
	Somewhat do not support	297	24.34
	Somewhat support	281	23.03
	Support	325	26.64
	Strongly support	317	25.98
General Disposal Methods of Obsolete Clothes	Directly discard	203	16.64
	Keep idle at home (long-term storage in wardrobe)	378	30.98
	Donate to charitable organizations	299	24.51
	Put in recycling bins or contact relevant agencies (e.g., Alipay Xianyu door-to-door recycling)	485	39.75
	Sell as waste	301	24.67
	DIY for personal use or gifting	121	9.92
	Give to relatives and friends	175	14.34
	Sell to second-hand stores	43	3.52
	Incinerate by oneself	48	3.93
	Crush into fillers (e.g., cotton wadding)	384	31.48

Table A1. *Cont.*

Variable	Option Category	Subtotal	Proportion
Availability of Classified Recycling Institutions nearby	Yes	599	49.1
	No	211	17.3
	Not noticed	410	33.61
Known Ways of Old Clothes Reuse (Multiple Choice	Reprocess cotton, linen, etc., into new clothes	80	6.56
	Direct reuse of buttons and zippers	582	47.7
	Reprocess into rags, insulating cloth, etc.	698	57.21
	Handle through second-hand stores or sell to places like Africa	384	31.48
	Other	100	8.2
Willingness to Buy Upcycled Old Clothes Products	Willing	58	4.75
	Unwilling	540	44.26
	Depends on the situation	622	50.98
Acceptable Upcycled Old Clothes Products (Multiple Choice	Pet clothes	516	42.3
	Doll clothes	346	28.36
	Characteristic bags	451	36.97
	Handmade material kits	475	38.93
	Carpets and cushions	572	46.89
	Others	86	7.05
Concerns about Upcycled Old Clothes Products (Multiple Choice)	Quality issues	826	67.7
	Price issues	610	50
	Hygiene issues	957	78.44
Perceived Necessity of Old Clothes Recycling	Necessary	816	66.89
	Unnecessary	84	6.89
	Indifferent	320	26.23
Groups Considered to Play a Significant Role in Recycling	Government	354	29.02
	Recycling enterprises	192	15.74
	Consumers	95	7.79
	Media (for promotion)	394	32.3
	Clothing enterprises	185	15.16
Known Recycling Channels (Multiple Choice)	Charitable organizations	601	49.26
	School donation activities	731	59.92
	Private low-price recycling	322	26.39
	Community recycling bins	708	58.03
	Others	91	7.46
Understanding of Post-Recycling Process	Know nothing	66	5.41
	Little understanding	187	15.33
	General understanding	501	41.07
	Clear understanding	324	26.56
	Very clear understanding	142	11.64

Table A1. *Cont.*

Variable	Option Category	Subtotal	Proportion
Preferred Nature of Handling Institutions	Pure public welfare donation institutions	615	50.41
	Organizations combining public welfare and commerce	391	32.05
	No preference	214	17.54
Willingness to Participate in Recycling with Professional Recyclers	Willing	896	73.44
	Unwilling	324	26.56
Willingness to Sell Old Clothes with Paid Recycling	Willing	782	64.1
	Unwilling	438	35.9
Factors Affecting Recycling Rate	Lack of recycling institutions, services and guidance	312	25.57
	Lack of awareness of recycling and reuse	191	15.66
	Unclear recycling channels	204	16.72
	Insufficient personal recycling awareness and motivation	191	15.66
	Insufficient government promotion and implementation	153	12.54
	Insufficient recycling education and promotion	118	9.67
	Other	51	4.18
Preferred Disposal Channels	Establish second-hand clothing markets	612	50.16
	Regular door-to-door recycling by professionals	443	36.31
	Self-delivery to recycling enterprises/sites	125	10.25
	Mailing to recycling enterprises/sites	40	3.28

Note: Data source: Student Survey Questionnaire, Shanghai Dianji University, June 2023–June 2024.

Table A2. Indicator Calculation.

Indicators	Information Entropy	Information Utility Value	Weight
Residents' understanding of waste clothing recycling			
Which of the following types of institutions are you willing to have handle your waste clothes?	0.893	0.107	0.141
If there are professionals responsible for recycling, are you willing to recycle your old clothes?	0.814	0.186	0.246
Are you willing to sell your idle clothes if there are enterprises, institutions or sites for paid recycling of waste clothes nearby?	0.856	0.144	0.190
What do you think is the reason for the low rate of clothing recycling?	0.809	0.191	0.253
Which way do you want to dispose of waste clothes?	0.922	0.078	0.103
If your school or community set up a waste clothing recycling station, what is your level of support?	0.949	0.051	0.067

Table A2. *Cont.*

Indicators	Information Entropy	Information Utility Value	Weight
Objective environment and conditions of waste clothing recycling			
Any classified recycling agency or organization around your home	0.899	0.101	0.231
The necessity of recycling old clothes	0.841	0.159	0.363
Groups that play an important role in the recycling of waste clothing	0.939	0.061	0.138
Recycling route	0.901	0.099	0.227
Disposal methods of waste clothes after recycling	0.982	0.018	0.041
Recycling mode of waste clothing			
Recycling mode of waste clothing	0.619	0.381	0.667
Willing to buy goods transformed from waste clothes (cleaned and disinfected)	0.985	0.015	0.025
Acceptance of secondary items of old clothe transformation	0.879	0.121	0.212
Concerns about the recycling of waste clothing	0.945	0.055	0.096

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