

Article

Does Political Participation Influence the Waste Classification Behavior of Rural Residents? Empirical Evidence from Rural China

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Abstract: Waste classification is an important part of the renovation of rural human settlements, and the renovation of rural human settlements is also of great significance to global sustainable development. Therefore, it is of the utmost importance to study the factors that affect the classification behavior for promoting waste classification behavior. However, few studies have focused on the political participation of rural residents as a driving factor. Therefore, this study aims to explore whether political participation affects rural residents' waste classification behavior. In particular, this study uses the China Land Economic Survey (CLES), which surveyed 2628 rural households in Jiangsu Province, China, and uses the Probit model to explore the quantitative impact of political participation on farmers' waste classification behavior. This study finds that: (1) Political participation may significantly improve farmers' waste classification behavior. Specifically, farmers who participated in the general election were 10.6% more likely to conduct waste classification than those who did not vote in the general election. (2) Groups receiving government subsidies may be more likely to understand the government's waste classification policy and then carry out waste classification. (3) Residents in areas with high economic development may be more sensitive to opportunity cost than residents in areas with low economic development, so residents in areas with high economic development degree are less willing to participate in waste classification action, and political participation has less influence on waste classification. Therefore, this research helps improve the efficiency of waste classification, ameliorate waste classification behavior, and provide the references for building a more civilized rural living environment.

Keywords: political participation; waste classification behavior; environmental pollution; Probit model; rural China



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1. Introduction

Global sustainable development faces many challenges and threats [1]. In particular, air pollution and water pollution are becoming increasingly serious. The massive global consumption of resources, such as fossil fuels, has caused serious air pollution problems [2,3], resulting in the health of the population suffering [4–7]. In addition, the globe faces serious water pollution [8]. Indeed, about 1.8 million people die each year from water-related diseases caused by unsafe drinking water or poor sanitary conditions [9]. However, improper treatment increases the challenge of solving the problem of environmental pollution, delaying the realization of global sustainable development.

Specifically, the traditional waste treatment approach, e.g., [10–12], has had negative impacts, such as environmental pollution, adverse effects on the health of the population, and climate warming intensifies. With the increase in the population, the amount of waste generation increases rapidly. It is estimated that global waste generation will increase by

70% by 2050 compared to 2016 [13]. Globally, 37% of controlled waste is disposed of in sanitary landfills [13]. Wang, et al. [14] showed that domestic waste composition is complex and usually contains high levels of organic matter (usually 50–70% of the total weight). Alam, et al. [15] found that leachate from landfills contains heavy metals, such as copper, cadmium, lead, nickel, and zinc, migrating to contaminate surfaces and groundwater [16]. Further, Wu, et al. [17] pointed out that because of the complexity of domestic waste, unclassified waste from landfills secretes compounds, including dichloromethane, tetrachloromethane, toluene, and benzene. Park, et al. [18] showed that dichloromethane has potentially negative effects on adults' respiratory, gastrointestinal, liver, and nervous systems. In Western Europe, Japan, and South Korea, the predominant treatment is municipal solid waste incineration [13]. In incineration, the complex components of domestic waste form a high amount of harmful gases, harming the ecological environment and threatening people's health [19]. It is reported that 5% of global carbon emissions are caused by solid waste; their burning adds to this number (World-Counts 2020). Global warming has become a serious problem due to greenhouse gas (GHG) emissions, especially carbon dioxide (CO₂) from burning fossil fuels [3]. According to the United Nations Intergovernmental Panel on Climate Change (IPCC 2019), human activities have contributed to global warming of about 1 °C, higher than pre-industrial levels, and they are predicted to reach 1.5 °C between 2030 and 2052. The effective and harmless use of waste has become an important way to solve the plight of human development; therefore, the world needs to strengthen the disposal of waste.

Waste classification is the precondition of the effective and harmless utilization of waste. According to The World Bank, in 2016, the global waste disposal methods included open-air dumping, landfills (non-classification, biogas, control), incineration, composting, and resource recovery. A total of 33% of the uncollected rubbish is dumped into the open air, 26% is disposed of unsorted, 7.7% involves landfill gas production, 11% is incinerated, 5.5% is composted, and 13.6% is recycled. Worldwide, the recovery and reuse rate of the recyclables in domestic waste is high in developed countries. The average is between 20% and 30%, but the process of the effective disposal of waste in developing countries is slow. However, in developing countries, the progress of harmless waste utilization is slow [20], and domestic waste is mostly treated in the open air. Waste separation management policies are almost nonexistent, especially in rural areas [21]. Therefore, how to improve the residents' waste classification behavior has become an urgent concern.

Because of the strong positive externalities of waste classification, it will increase the additional costs of residents but cannot get the corresponding benefits. Residents' responses to waste classification policies are insufficient. Chinese residents' awareness of waste classification and collection is still weak [22], and the recycling rate of urban waste in China is less than 2% [23]. Yuan and Yabe [24] showed that about 42.4% residents in some areas of Beijing are not willing to pay for waste classification. At the same time, broad political participation is defined as civic behavior that influences political representatives' choice and/or action and has inner democratic values [25]. Blais and St-Vincent [26] showed a positive correlation between political interest and political participation. R.Abramson and H.Aldrich [27] and Karp and Banducci [28] showed a positive correlation between political effectiveness and political engagement. However, no research exists on whether political participation can also motivate residents to respond to waste classification policies, demonstrating waste classification behavior.

China is one of the largest developing countries in the world. According to the Ministry of Housing and construction, the per capita daily output of rural household waste in 2019 was about 0.96 kg, with an annual output of 216 million tons. From 2013 to 2019, the average annual growth rate of household waste was 9.48%, of which at least 90 million tons were untreated [17]. The Chinese Government is actively promoting rural revitalization, and an important goal is to build ecological villages. To this end, the Chinese Government has put forward a comprehensive waste classification policy. However, residents have different perceptions of waste classification policies [29]. The Chinese Government is carrying

out a three-year campaign to improve the living environment in rural areas to increase the willingness of rural households to participate in waste classification. At the same time, the Chinese Government is also encouraging farmers to care about and participate in grassroots political activities. For example, civil servants are directly recruited from outstanding farmers [30]. Therefore, this study takes rural China as a case study to explore the quantitative impact of rural residents' political participation on waste classification behavior, helping to promote rural revitalization in China. It will also help provide references for the global sustainable development process.

2. Theoretical Analysis

Wang, et al. [31] pointed out that the driving forces of classification behavior of domestic waste are mainly psychological and external factors. Concerning internal factors, the perception and attitude towards classification will have an impact. In external factors, distance and condition play an important role [32]. Passive residents tend to have a shallow intention to separate waste, whereas active residents tend to separate waste [33]. Waste separation can reprocess the recyclable waste and realize the reuse of waste, reducing the harm of hazardous waste to the environment and enhancing the positive externality of the environment (i.e., motive–action–result).

Several studies have shown that education, situational factors, social media, environmental facilities, service convenience, social capital, financial instruments, and other factors contribute to residents' waste classification behavior:

- (1) *Education*: High-educated and high-income residents are more likely to support waste classification than low-educated and low-income residents [34].
- (2) *Situational factors*: Loan, et al. [35] found that situational factors (i.e., time, space, lack of family cooperation, and other physical waste classification problems) significantly affect the behavior of the family regarding the source separation of organic waste.
- (3) *Social media*: Hyun and Kim [36] showed that social media offers citizens new opportunities to participate in the news and political process. When used for political purposes, social media can facilitate various types of participation.
- (4) *Environmental facilities and service accessibility*: Meng, et al. [37] showed that the convenience of environmental facilities and services is the most effective factor to promote residents' participation in waste classification and recycling.
- (5) *Social capital*: Liu and Feng [38] showed that social capital (networking social capital, social networks, and social trust) could effectively promote the process of waste classification in China.
- (6) *Financial instruments*: Matiuk and Liobikiene [39] showed that financial instruments (e.g., incentives and tax breaks) provide incentives for categorical behavior.

Political participation plays an important role in the implementation of policies. On the contrary, low political participation will hinder the implementation of government policies. According to the classic definition of Verba and Nie [40], political participation is an act designed to influence the choice of government personnel and/or policies. In the light of social and technological changes, Fox [41] stressed the need for a revised concept requiring broader political activity. Massimiliano Cerciello, et al. [42] noted that the implementation of the policy in the southern regions of Italy was hampered by the lack of political participation of citizens. Political participation can affect residents' waste classification on two levels. One is the subjective level, which is reflected in residents' perception and attitudes, such as their political, emotional quality, political trust, and participation (active, responsive, or passive). The residents with high degrees of political participation are more willing to respond to policies. The other is on the objective level. Indeed, participating in democratic decision making can be closer to government policies and understanding policies.

2.1. Political Participation Affects the Residents' Waste Classification Behavior at the Subjective Level

- (1) Political sentiment is a necessary force for political and civic engagement [43]. It has figured prominently in the agitation for more effective forms and practices of participatory democracy [44]. Marcus and MacKuen [45] pointed out that anxiety and enthusiasm are both important for political learning and engagement. According to Potter [46], political literacy extends beyond political knowledge to encompass awareness and understanding a range of economic and social issues. People who choose political work report higher levels of emotional work [47].
- (2) Political trust can be defined as citizens' judgments of responsiveness to the system and its representation [48] and trustworthiness [49]. Political trust comes from citizens' identification with the values represented by the state and "Citizens' belief in the normative appropriateness of government structures, officials and procedures". Levi, et al. [50] stated that for citizens to participate and vote with confidence that the electoral system is working, they must believe that their votes have been properly counted. In an institutionalized democracy, the political trust of the better educated is higher than for the less educated [51]. Individuals with high levels of trust are more likely to be actively engaged in prosocial activities, and waste classification is also a prosocial behavior [52].
- (3) The individual's tendency to participate also affects people's behavior subjectively. Vromen [53] proposed that political participation and the possible actions, both individual and collective, are relevant to shaping the society we want to live in. Academic research has shown that political participation is associated with the level of participation of religious and civic groups and the more general tendency of individuals to participate [54].

2.2. Political Participation Influences the Residents' Waste Classification Behavior on the Objective Level

The structure of political opportunity is a dominant factor influencing public participation in government environmental decision making in China, weakening the influence of other restrictive factors [55]. Political opportunity shapes policy-driven activism [56]. Etemire [57] showed that public participation in decision making and governance has been widely recognized as ultimately contributing to ensuring sustainable development, increasing human well-being, and protecting the human environment.

3. Data, Variables, and Method

3.1. Data

In this paper, the data from China Land Economic Survey in 2020 were used for empirical analysis. The Nanjing Agricultural University launched CLES2020 in 2020, and in 2020, the teams conducted baseline surveys in Jiangsu Province based on the establishment and survey of fixed observation points in rural Jiangsu Province. The present rural social and economic development situation in Jiangsu Province was analyzed comprehensively, and PPS sampling was adopted. The questionnaire covered land market, agricultural production, rural industry, ecological environment, poverty alleviation, rural finance, and so on.

The data of CLES2020 were collected from 26 counties in 13 prefecture-level cities of Jiangsu Province. Two sample towns were selected from each district and county. Each township was selected from one administrative village, and each village was randomly selected from 50 rural households. After data cleaning, 2628 samples were used for empirical analysis.

3.2. Variables

Explained variable: The waste classification behavior of farmers is the explained variable. Because waste can be classified according to different standards, according to the nature of the classification, it can be divided into hazardous waste or general waste. According to

the state of classification can be divided into solid waste, liquid waste, or gas waste. It can be classified into organic and inorganic waste according to its composition and domestic, industrial, and agricultural waste according to its system. Because of the differences in classification criteria and geographical and environmental conditions, the explained variable is whether or not the farmer has waste classification behavior.

Core explanatory variable: Political participation is the core explanatory variable of this paper. Rural residents' political participation forms include election-type participation, decision-making participation, management-type participation, supervision-type participation, petition-type participation, over-the-top petition, individual contact, and recourse to the media [58]. However, it is not convenient to retrieve these statistics in reality; therefore, this paper defines the core explanatory variable as whether farmers participated in voting in general elections.

Control Variables: This paper introduces the following control variables that can affect farmers' waste classification behavior to improve the estimation ability of the model: personal characteristics (e.g., sex, age, health status, and education level), basic household characteristics, and environmental characteristics (e.g., total population, total income, whether there is use of smartphones, and whether there is surrounding environmental pollution). Research has consistently shown that family and personal attributes influence waste classification and environmental awareness [59].

The variable definitions and data descriptions used in this article are found in Table 1.

Table 1. The definition and data description of the variables in the model.

Variable	Definition	Mean Value	Standard Deviation
WSTB	Are farmers involved in waste classification? (1 = Yes; 0 = No)	0.482	0.500
Political Participation	Do farmers vote in general elections? (1 = Yes; 0 = No)	0.728	0.445
Gender	Farmer's sex (1 = Male; 0 = Female)	0.698	0.459
Age	Farmer's age (year)	61.046	11.329
Health	Farmer's health (1 = Good; 0 = Bad)	0.700	0.458
Education	Farmer's education (year)	6.900	3.948
Family Size	Household total population (Num)	3.228	1.663
Family Income	Total household income (yuan)	24,443.050	127,885.039
Smartphone Use	Whether a household uses a smartphone (1 = Yes; 0 = No)	0.854	0.353
Environmental Pollution	Whether its surroundings are polluted by the environment (1 = Yes; 0 = No)	0.365	0.481

3.3. Method

Because the explained variable is a discrete binary variable, the binary Probit model is more suitable. Based on the method of regression analysis, the Probit regression model is used to analyze the impact of political participation on the waste classification behavior of rural residents. The formula is as follows:

$$Action_i = \beta_0 + \beta_{1i}Pol_i + \beta_{2i}Ind_i + \beta_{3i}Fam_i + \delta_k + \varepsilon_i$$

The subscripts i and k represent the household i and the sample village k , respectively. $Action_i$ is the dependent variable, representing the waste classification behavior of rural residents. Pol_i is the core independent variable, indicating whether farmers participate in politics. Ind_i and Fam_i represent the characteristics of the head of household and family, respectively. β_0 represents the constant term. β_{1i} represents the estimated coefficient of political participation. β_{2i} and β_{3i} separately represent estimated coefficients of household characteristics and family characteristics for the control variables. δ_k represents the dummy variable, which is the village effect of each village. Finally, ε_i represents a random disturbance.

4. Results

4.1. Correlation Test

As shown in Figure 1, correlation coefficients between variables are reported. In Figure 1, the darker the color of the Ellipse, the higher the correlation between variables, and vice versa. As can be seen from Figure 1, the correlations between age and education and age and smartphone use are high, but the correlations between the other control variables and political participation are low or non-existent. This means that the multicollinearity question may not be important in this study.

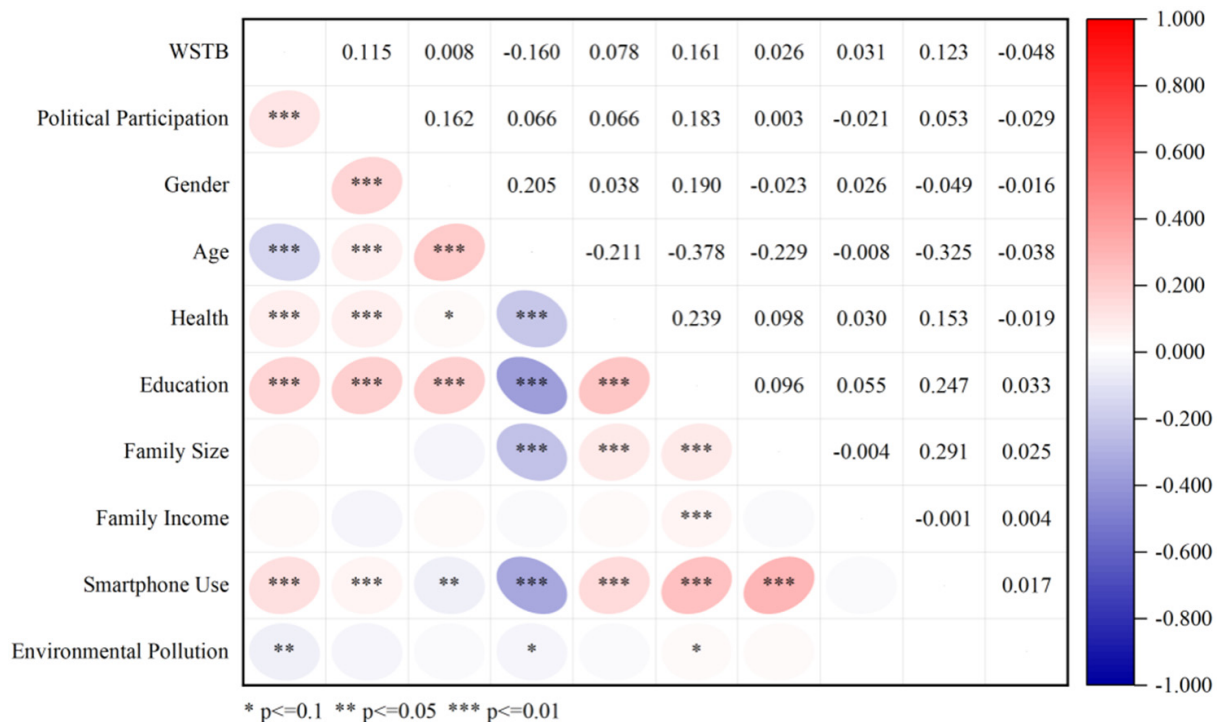


Figure 1. The heatmap for the matrix of Pearson's correlation coefficients.

4.2. Estimation of the Impact of Political Participation on Rural Residents' Waste Classification Behavior

Table 2 shows the estimated impact of political participation on farmers' participation in waste classification. In Table 2 (1)–(4), the Probit model is used to estimate the waste classification behavior of farmers. At the same time, considering that the Probit model is a nonlinear model, model (5) is the marginal effect estimation results based on model (4) to facilitate interpretation of the estimation results. In addition, this study adopts the strategy of adding variables step by step to improve the estimation accuracy as much as possible. That is, on the basis of model (1), model (2)–(4) gradually controls household, family, and village characteristics.

According to the estimated results in Table 2, the political participation variables in models (1)–(4) are significant at the 1% level, indicating that farmers' participation in voting in general elections can promote the possibility of farmers' participation in waste classification. That is, political participation can promote the possibility of farmers participating in waste classification. According to model (5) estimated results, compared with farmers who did not vote in the general election, farmers who voted were 10.60% more likely to participate in waste classification. In addition, the estimated results in Table 2 show that the education variable of farmers is significant at the 1% level, indicating that improving farmers' education level can also improve farmers' participation in waste classification behaviors.

Table 2. Main regression results.

	Model (1)	Model (2)	Model (3)	Model (4)	Marginal Effects
Political Participation	0.326 *** (5.876)	0.309 *** (5.353)	0.307 *** (5.296)	0.321 *** (5.010)	0.106 *** (5.073)
Gender		0.008 (0.143)	0.011 (0.193)	−0.019 (−0.288)	−0.006 (−0.288)
Age		0.015 (0.904)	0.006 (0.383)	0.003 (0.178)	0.001 (0.178)
Age ²		−0.000 * (−1.854)	−0.000 (−1.262)	−0.000 (−0.880)	−0.000 (−0.880)
Health		0.069 (1.218)	0.054 (0.942)	0.021 (0.341)	0.007 (0.341)
Education		0.030 *** (4.126)	0.027 *** (3.641)	0.026 *** (3.147)	0.009 *** (3.157)
Family Size			−0.021 (−1.344)	−0.008 (−0.425)	−0.003 (−0.425)
Family Income			0.000 (1.499)	−0.000 (−0.169)	−0.000 (−0.169)
Smartphone Use			0.227 *** (2.819)	0.242 *** (2.788)	0.080 *** (2.799)
Environmental Pollution			−0.143 *** (−2.760)	−0.182 *** (−3.212)	−0.060 *** (−3.228)
Constant	−0.282 *** (−5.937)	−0.433 (−0.907)	−0.279 (−0.573)	−0.834 (−1.538)	
Village Dummies	No	No	No	Yes	Yes
Log pseudolikelihood	−1802.590	−1750.149	−1739.459	−1528.204	−1528.204
χ^2	34.524 ***	133.777 ***	151.111 ***	509.493 ***	509.493 ***
R ²	0.010	0.037	0.042	0.158	0.158
Observation	2628	2624	2622	2622	2622

Note: t statistics in parentheses; * $p < 0.1$, *** $p < 0.01$.

4.3. Robustness Test

This study adopted the instrumental variable method and the measurement method of changing the core variable to test the robustness of the estimated results in Table 2. As shown in Table 3, model (1) represents regression with trust in village cadres as an instrumental variable. Models (2) and (3) indicate that the core variables are “whether there is a party member household” and “whether there are village cadres”, respectively. According to the estimation results in Table 3, the coefficients of political participation variables in models (1)–(3) are significantly greater than zero (at least 5%), indicating that political participation can improve the possibility of farmers’ participation in waste classification. This also indicates that the estimation results in Table 2 are robust.

Table 3. Robustness test.

	Model (1)	Model (2)	Model (3)
Political Participation	1.740 *** (6.712)	0.147 ** (2.379)	0.219 *** (2.855)
Control Variables	Yes	Yes	Yes
Log pseudolikelihood	−2904.024	−1538.033	−1536.986
χ^2	1074.905 ***	491.024 ***	487.642 ***
R ²		0.153	0.154
Observation	2622	2622	2622

Note: t statistics in parentheses; ** $p < 0.05$, *** $p < 0.01$.

4.4. Heterogeneity Test

Introducing political factors (whether to receive government subsidies) and economic factors (the city GDP per capita is more than 100,000) as the two factors was undertaken to test whether the political participation variable has different effects on a household’s

participation in waste classification behavior due to individual differences. Farmers in different areas were divided into two groups according to two criteria:

As shown in Table 4, models (1) and (2) were based on whether to receive government subsidies grouping; groups that have received government subsidies may be more likely to understand the government's waste classification policy and support the government. Therefore, household registration and political participation have a greater impact on waste classification.

Table 4. Heterogeneity test.

	Model (1)	Model (2)	Model (3)	Model (4)
Political Participation	0.364 *** (5.483)	0.114 (0.908)	0.183 ** (2.305)	0.394 *** (4.442)
Control Variables	Yes	Yes	Yes	Yes
Log pseudolikelihood	−1375.506	−358.137	−1064.854	−659.154
χ^2	122.837 ***	41.502 ***	104.226 ***	57.781 ***
R ²	0.043	0.055	0.047	0.042
Observation	2075	547	1613	1009
Suest- χ^2		3.158 *		3.181 *

Note: t statistics in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

In models (3) and (4) of Table 4, the level of economic development is measured by whether the per capita GDP of the city exceeds 100,000. Residents in areas with high economic development may be more sensitive to opportunity costs. That is the income that people give up when they use limited resources to get a certain income, and that income is what we call opportunity cost. Lv and Peng [60] believed that there was a significant positive correlation between the opportunity cost of family care for the elderly and the level of regional economic development, that is, compared with the less developed areas, the opportunity cost of people's behavioral choices in the economically developed areas was higher. Therefore, residents in areas with a high degree of economic development are less willing to participate in waste classification, and political participation has a lower influence on waste classification.

As shown in Table 4, model (1) means that the political participation variable is significant at 1%. In model (2), it is not significant. In model (3), it is significant at 5%. In model (4), it is significant at 1%. The seemingly unrelated test supports the above differences.

5. Discussion

This paper has a high correlation with the existing research. For example, Ting and Ahmad [61] emphasized the direct link between political dialogue and the frequency of children's traditional and radical actions. Cornejo, et al. [62] showed that political participation can amplify the positive relationship between individuals' perceptions of environmental threats and their support for lower living standards and government spending on environmental protection. The conclusion of this study is that political participation can promote the waste classification behavior of farmers, which plays a positive role in studying the role of political participation.

This study also finds that residents' waste classification behavior is more obvious in people and areas with high education levels, high smartphone use levels, and serious environmental pollution. This is consistent with the research results of Peng, et al. [63], Ma and Zhu [64], and Kuang and Lin [65]. For example, Peng et al. [65] believed that education significantly transforms unclassified residents into classified residents. The research conclusion of Ma and Zhu [64] highlighted the importance of disseminating waste classification information through the internet media, especially smartphones. Kuang and Lin [65] pointed out that the more residents pay attention to urban environmental pollution, the more likely they are to participate in waste classification.

In addition, this study found that age has no significant impact on farmers' waste classification behavior. Boon, et al. [66] and Okumah, et al. [67] believed that there is a

negative correlation between age and pro-environment behavior. The possible reason is that waste classification does not require much physical labor. Therefore, age has no significant influence on waste classification behavior. Heterogeneity results of this study show that residents in developed areas are less willing to respond to policies than those in less developed areas due to opportunity costs. This is different from the research results of Refsgaard and Magnussen [68]. Refsgaard and Magnussen [68] showed that household income has a positive impact on the waste classification behavior of farmers. The research object is highly developed countries. The results of this study show that household income has no significant impact on the waste classification behavior of farmers, and the research object is developing countries. This may be because both the developed and the less developed areas mentioned in this paper are in developing countries. In addition, heterogeneous results also show that registered households (groups that receive government subsidies) are more supportive of waste classification policies, suggesting that the Chinese Government will get more environmental benefits in return for helping the poor. In the existing literature, Listyaningsih, et al. [69] explored that poverty alleviation plans can be implemented through poverty level detection, Leadley, et al. [70] showed that poverty can lead to occupational deprivation and occupational inequity, with lifelong impacts on individuals' health and well-being, Jakunskiene [71] explored the relationship between poverty and social responsibility, but there are few discussions on the relationship between poor populations and environmental benefits. Therefore, the findings of this study provide new evidence for discussing the environmental welfare effects of poverty management.

This study still has some limitations. It is hoped that future research will solve the following problems:

- (1) This study took rural areas in Jiangsu Province of China as the case area, which cannot represent the waste classification situation in rural areas in other provinces of China. Future studies can take rural areas in other provinces of China as case areas to conduct empirical studies to test whether the conclusions of this study are applicable to rural areas in other provinces of China.
- (2) This study took rural China as the case area. In recent years, the Chinese Government has been committed to the improvement in the rural human settlement environment. Future studies can further test whether the results of this study can be applied to other developing countries.
- (3) This study mainly discussed the influence of political participation on the waste classification of farmers. A future research direction may be to evaluate the influence of political participation on the waste classification of urban residents.

6. Conclusions and Implications

The study was based on the CLES2020 data, and the Probit model was used for regression analysis to evaluate the quantitative impact of political participation on farmers' waste classification behaviors. The main conclusions are as follows:

- (1) Political participation may significantly improve farmers' waste classification behavior. Specifically, farmers who participated in the general election were 10.6% more likely to conduct waste classification than those who did not vote in the general election.
- (2) Groups receiving government subsidies may be more likely to understand the government's waste classification policy and then carry out waste classification.
- (3) Residents in areas with high economic development may be more sensitive to opportunity cost than residents in areas with low economic development, so residents in areas with high economic development degrees are less willing to participate in waste classification action, and political participation has less influence on waste classification.

In view of the above conclusion, this study found that political participation has improved the behavior of waste classification of farmers, so how to improve the farmers political participation behavior is crucial, which may reveal the policymakers taking an active role in stimulating residents to participate in village management activities, such as participation in village elections. In addition, this study found that the residents had a low

waste classification behavior in areas with high opportunity cost, such as areas with high economic development. It may reveal the policymakers taking more subsidies to weaken the negative impacts of high opportunity cost for waste classification.

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References

- Li, H.S. Global risk report main content 2021. *Disaster Reduct. China* **2021**, *5*, 16–19.
- Liang, X. Research on the Causes and Prevention Strategies of Air Environmental Pollution. *Earth Environ. Sci.* **2021**, *651*, 042050. [[CrossRef](#)]
- Saito, S. Role of nuclear energy to a future society of shortage of energy resources and global warmin. *J. Nucl. Mater.* **2010**, *398*, 1–9. [[CrossRef](#)]
- Laumbach, R.; Meng, Q.; Kipen, H. What can individuals do to reduce personal health risks from air pollution? *J. Thorac. Dis.* **2015**, *7*, 96–107. [[CrossRef](#)] [[PubMed](#)]
- Kelly, F.J.; Fussell, J.C. Air pollution and public health: Emerging hazards and improved understanding of risk. *Environ. Geochem. Health* **2015**, *37*, 631–649. [[CrossRef](#)] [[PubMed](#)]
- Liu, H.; Salvo, A.; He, J. Severe Air Pollution and Labor Productivity: Evidence from Industrial Towns in China. *Am. Econ. J. Appl. Econ.* **2019**, *11*, 173–201. [[CrossRef](#)]
- Zheng, S.; Wang, J.; Sun, C.; Zhang, X.; Kahn, M.E. Air pollution lowers Chinese urbanites' expressed happiness on social media. *Nat. Hum. Behav.* **2019**, *3*, 237–243. [[CrossRef](#)] [[PubMed](#)]
- Feng, C.L.; Yu, L.; Xiao, Y.H.; An, C.J. Environmental Behavior and Effects of Pollutants in Water. *J. Chem.* **2020**, *2020*, 2639389. [[CrossRef](#)]
- Mathieu, J.; Yu, P.; Zuo, P.; Da Silva, M.L.B.; Alvarez, P.J.J. Going Viral: Emerging Opportunities for Phage-Based Bacterial Control in Water Treatment and Reuse. *Acc. Chem. Res.* **2019**, *52*, 849–857. [[CrossRef](#)] [[PubMed](#)]
- Zeng, D.; Chen, G.; Zhou, P.; Xu, H.; Qiong, A.; Duo, B.; Lu, X.; Wang, Z.; Han, Z. Factors influencing groundwater contamination near municipal solid waste landfill sites in the Qinghai-Tibetan plateau. *Ecotoxicol. Environ. Saf.* **2021**, *211*, 111913. [[CrossRef](#)] [[PubMed](#)]
- Tait, P.W.; Brew, J.; Che, A.; Costanzo, A.; Danyluk, A.; Davis, M.; Khalaf, A.; McMahon, K.; Watson, A.; Rowcliff, K.; et al. The health impacts of waste incineration: A systematic review. *Aust. N. Z. J. Public Health* **2020**, *44*, 40–48. [[CrossRef](#)] [[PubMed](#)]
- Scopetani, C.; Chelazzi, D.; Cincinelli, A.; Martellini, T.; Leinio, V.; Pellinen, J. Hazardous contaminants in plastics contained in compost and agricultural soil. *Chemosphere* **2022**, *293*, 133645. [[CrossRef](#)] [[PubMed](#)]
- Kaza, S.; Yao, L.; Bhada-Tata, P.; Woerden, F.V. What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050. In *International Bank for Reconstruction and Development*; The World Bank: Washington, DC, USA, 2018.
- Wang, Y.; Li, L.; Qiu, Z.; Yang, K.; Han, Y.; Chai, F.; Li, P.; Wang, Y. Trace volatile compounds in the air of domestic waste landfill site: Identification, olfactory effect and cancer risk. *Chemosphere* **2021**, *272*, 129582. [[CrossRef](#)] [[PubMed](#)]
- Alam, P.; Sharholi, M.; Ahmad, K. A Study on the Landfill Leachate and Its Impact on Groundwater Quality of Ghazipur Area, New Delhi, India. In *Recent Developments in Waste Management*; Lecture Notes in Civil Engineering; Springer: Singapore, 2020; pp. 345–358.
- Mohamed, A.F.; Yaacob, W.W.; Taha, M.R.; Samsudin, A.R. Groundwater and soil vulnerability in the Langat Basin Malaysia. *Eur. J. Sci. Res.* **2009**, *27*, 628–635.

17. Wu, C.; Liu, J.; Liu, S.; Li, W.; Yan, L.; Shu, M.; Zhao, P.; Zhou, P.; Cao, W. Assessment of the health risks and odor concentration of volatile compounds from a municipal solid waste landfill in China. *Chemosphere* **2018**, *202*, 1–8. [\[CrossRef\]](#)
18. Park, A.S.; Ritz, B.; Ling, C.; Cockburn, M.; Heck, J.E. Exposure to ambient dichloromethane in pregnancy and infancy from industrial sources and childhood cancers in California. *Int. J. Hyg. Environ. Health* **2017**, *220*, 1133–1140. [\[CrossRef\]](#) [\[PubMed\]](#)
19. Cheng, L. Treatment technology of flue gas pollution from MSW incineration power plant. *Smart City Appl.* **2021**, *4*, 57–59. [\[CrossRef\]](#)
20. Sembiring, E.; Nitivattananon, V. Sustainable solid waste management toward an inclusive society: Integration of the informal sector. *Resour. Conserv. Recycl.* **2010**, *54*, 802–809. [\[CrossRef\]](#)
21. Browning, S.; Beymer-Farris, B.; Seay, J.R. Addressing the challenges associated with plastic waste disposal and management in developing countries. *Curr. Opin. Chem. Eng.* **2021**, *32*, 100682. [\[CrossRef\]](#)
22. Gu, B.X.; Wang, H.K.; Chen, Z.; Jiang, S.Q.; Zhu, W.M.; Liu, M.M.; Chen, Y.Q.; Wu, Y.; He, S.; Cheng, R. Characterization, quantification and management of household solid waste: A case study in China. *Resour. Conserv. Recycl.* **2015**, *98*, 67–75. [\[CrossRef\]](#)
23. Zhang, S.P.; Zhang, M.L.; Yu, X.Y.; Ren, H. What keeps Chinese from recycling: Accessibility of recycling facilities and the behavior. *Resour. Conserv. Recycl.* **2016**, *109*, 176–186. [\[CrossRef\]](#)
24. Yuan, Y.L.; Yabe, M. Residents' Willingness to Pay for Household Kitchen Waste Separation Services in Haidian and Dongcheng Districts, Beijing City. *Environments* **2014**, *1*, 190–207. [\[CrossRef\]](#)
25. Isaksson, A.-S. Political participation in Africa: The role of individual resources. *Elect. Stud.* **2014**, *34*, 244–260. [\[CrossRef\]](#)
26. Blais, A.; St-Vincent, S.L. Personality traits, political attitudes and the propensity to vote. *Eur. J. Political Res.* **2011**, *50*, 395–417. [\[CrossRef\]](#)
27. Abramson, P.R.; Aldrich, J.H. The Decline of Electoral Participation in America. *Decline Elect. Particip. Am.* **1982**, *76*, 502–520. [\[CrossRef\]](#)
28. Karp, J.A.; Banducci, S.A. Political Efficacy and Participation in Twenty-Seven Democracies: How Electoral Systems Shape Political Behaviour. *Br. J. Political Sci.* **2008**, *38*, 311–334. [\[CrossRef\]](#)
29. Han, Z.Y.; Zeng, D.; Li, Q.B.; Cheng, C.; Shi, G.Z.; Mou, Z.S. Public willingness to pay and participate in domestic waste management in rural areas of China. *Resour. Conserv. Recycl.* **2019**, *140*, 166–174. [\[CrossRef\]](#)
30. Chen, X. Civil Service to Harvest Experience of Farmers. Available online: http://www.chinadaily.com.cn/china/2010-10/12/content_11396439.htm (accessed on 12 October 2010).
31. Wang, K.; Lu, J.; Liu, H. Residents' waste source separation behaviours in Shanghai, China. *J. Mater. Cycles Waste Manag.* **2021**, *23*, 937–949. [\[CrossRef\]](#)
32. Guo, H.W.; Tong, L.; Shu, T.C.; Li, X.; Bai, B.J.; Nie, X.Q. Characteristics of community domestic waste separation: Separation amount, physical and chemical characteristics. *Earth Environ. Sci.* **2021**, *836*, 012020. [\[CrossRef\]](#)
33. Wang, X. Analysis of influencing mechanism on waste separation behavior in Shanghai. *Sustain. Energy Technol. Assess.* **2021**, *47*, 101479. [\[CrossRef\]](#)
34. Yuan, Y.; Yabe, M. Residents' preferences for household kitchen waste source separation services in Beijing: A choice experiment approach. *Int. J. Environ. Res. Public Health* **2014**, *12*, 176–190. [\[CrossRef\]](#) [\[PubMed\]](#)
35. Loan, L.T.T.; Nomura, H.; Takahashi, Y.; Yabe, M. Psychological driving forces behind households' behaviors toward municipal organic waste separation at source in Vietnam: A structural equation modeling approach. *J. Mater. Cycles Waste Manag.* **2017**, *19*, 1052–1060. [\[CrossRef\]](#)
36. Hyun, K.; Kim, J. Differential and interactive influences on political participation by different types of news activities and political conversation through social media. *Comput. Hum. Behav.* **2015**, *45*, 328–334. [\[CrossRef\]](#)
37. Meng, X.; Tan, X.; Wang, Y.; Wen, Z.; Tao, Y.; Qian, Y. Investigation on decision-making mechanism of residents' household solid waste classification and recycling behaviors. *Resour. Conserv. Recycl.* **2019**, *140*, 224–234. [\[CrossRef\]](#)
38. Liu, M.W.; Feng, Q.X. Does Social Capital Promote Garbage Classification? Evidence from China. *SAGE Open* **2021**, *11*, 21582440211040781. [\[CrossRef\]](#)
39. Matiuk, Y.; Liobikiene, G. The impact of informational, social, convenience and financial tools on waste sorting behavior: Assumptions and reflections of the real situation. *J. Environ. Manag.* **2021**, *297*, 113323. [\[CrossRef\]](#) [\[PubMed\]](#)
40. Verba, S.; Nie, N. Participation in America: Political Democracy and Social Equality. *Br. J. Sociol.* **1973**, *24*, 513–514.
41. Fox, S. Is it Time to Update the Definition of Political Participation? *Parliam. Aff.* **2013**, *67*, 495–505. [\[CrossRef\]](#)
42. Cerciello, M.; Agovino, M.; Garofalo, A. The caring hand that cripples? The effects of the European regional policy on local labour market participation in Southern Italy. *Socio-Econ. Plan. Sci.* **2019**, *68*, 100703. [\[CrossRef\]](#)
43. Knight Abowitz, K.; Mamlok, D. The case of #NeverAgainMSD: When proceduralist civics becomes public work by way of political emotion. *Theory Res. Soc. Educ.* **2019**, *47*, 155–175. [\[CrossRef\]](#)
44. Ruitenberg, C.W. Educating Political Adversaries: Chantal Mouffe and Radical Democratic Citizenship Education. *Stud. Philos. Educ.* **2009**, *28*, 269–281. [\[CrossRef\]](#)
45. Marcus, G.E.; MacKuen, M.B. Anxiety, Enthusiasm, and the Vote: The Emotional Underpinnings of Learning and Involvement During Presidential Campaigns. *Am. Political Sci. Rev.* **1993**, *87*, 672–685. [\[CrossRef\]](#)
46. Potter, J. The challenge of education for active citizenship. *Educ. Train.* **2002**, *44*, 57–66. [\[CrossRef\]](#)

47. Zhou, W.; Zhang, F.; Wang, X.; Montenegro-Marin, C.E.; Kadry, S.N. Analysis of the influence of politics on work emotion in workplace. *Aggress. Violent Behav.* **2021**, 101563. [\[CrossRef\]](#)
48. Miller, A.H.; Listhaug, O. Political Parties and Confidence in Government: A Comparison of Norway, Sweden and the United States. *Br. J. Political Sci.* **1990**, 20, 357–386. [\[CrossRef\]](#)
49. Blind, P.K. Building trust in government in the twenty-first century: Review of literature and emerging issues. In *7th Global Forum on Reinventing Government Building Trust in Government*; UNDESA: New York, NY, USA, 2007; pp. 26–29.
50. Levi, M.; Sacks, A.; Tyler, T. Conceptualizing Legitimacy, Measuring Legitimizing Beliefs. *Am. Behav. Sci.* **2009**, 53, 354–375. [\[CrossRef\]](#)
51. Kołczyńska, M. Democratic values, education, and political trust. *Int. J. Comp. Sociol.* **2020**, 61, 3–26. [\[CrossRef\]](#)
52. Chen, F.; Chen, H.; Jin, Y.; Wang, F.; Chen, W.; Wu, M.; Li, W.; Li, S.; Long, R. Impact of cognition on waste separation behavior-Nonlinear moderating effect by trustworthiness for links. *J. Clean. Prod.* **2021**, 296, 126525. [\[CrossRef\]](#)
53. Vromen, A. Publication details, including instructions for authors and subscription information. *Aust. J. Political Sci.* **2003**, 38, 79–99. [\[CrossRef\]](#)
54. Verba, S. Positive Theory, Normative Theory, and Practical Politics: Sidney Verba, Kay Lehman Schlozman, and Henry E. Brady's Voice and Equality: Civic Voluntarism in American Politics. *Am. Political Sci. Rev.* **1997**, 91, 421.
55. Zhang, X.J. *Political Opportunity Structure: A Key Factor Impacting Public Participation in Governmental Environmental Decision Making in PR China*; Northeastern University: Shenyang, China, 2010. (In Chinese)
56. Platt, M.B. Participation for What? A Policy-motivated Approach to Political Activism. *Political Behav.* **2008**, 30, 391–413. [\[CrossRef\]](#)
57. Etemire, U. A Fresh Perspective on the Human Right to Political Participation and Environmental Decision-Making in Nigeria. *Afr. J. Int. Comp. Law* **2018**, 26, 565–584. [\[CrossRef\]](#)
58. Li, Z.Y. The Styles and the Characteristics of the Peasantry Political Participation in China. *J. Huaihua Univ.* **2013**, 32, 24–27. [\[CrossRef\]](#)
59. Liu, A.; Osewe, M.; Wang, H.; Xiong, H. Rural Residents' Awareness of Environmental Protection and Waste Classification Behavior in Jiangsu, China: An Empirical Analysis. *Int. J. Environ. Res. Public Health* **2020**, 17, 8928. [\[CrossRef\]](#)
60. Lv, M.Y.; Peng, X.Z. Opportunity Cost Study of Family Care for the Elderly—Discussion Based on Multiple Perspectives such as Urban and Rural Area. *Soc. Sci. Ningxia* **2021**, 2, 118–131.
61. Ting, S.-H.; Ahmad, S.S.W. Everyday interactions and political participation of Malaysian youth. *J. Youth Stud.* **2021**, 1–20. [\[CrossRef\]](#)
62. Cornejo, M.; Rocha, C.; Castro, D.; Varela, M.; Manzi, J.; Gonzalez, R.; Jimenez-Moya, G.; Carvacho, H.; Alvarez, B.; Valdenegro, D.; et al. The intergenerational transmission of participation in collective action: The role of conversation and political practices in the family. *Br. J. Soc. Psychol.* **2021**, 60, 29–49. [\[CrossRef\]](#)
63. Peng, H.; Shen, N.; Ying, H.; Wang, Q. Factor analysis and policy simulation of domestic waste classification behavior based on a multiagent study—Taking Shanghai's garbage classification as an example. *Environ. Impact Assess. Rev.* **2021**, 89, 106598. [\[CrossRef\]](#)
64. Ma, W.; Zhu, Z. Internet use and willingness to participate in garbage classification: An investigation of Chinese residents. *Appl. Econ. Lett.* **2020**, 28, 788–793. [\[CrossRef\]](#)
65. Kuang, Y.; Lin, B. Public participation and city sustainability: Evidence from Urban Garbage Classification in China. *Sustain. Cities Soc.* **2021**, 67, 102741. [\[CrossRef\]](#)
66. Boon, T.E.; Broch, S.W.; Meilby, H. How financial compensation changes forest owners' willingness to set aside productive forest areas for nature conservation in Denmark. *Scand. J. For. Res.* **2010**, 25, 564–573. [\[CrossRef\]](#)
67. Okumah, M.; Yeboah, A.S.; Asante-Wusu, I. Unpacking the moderating role of age and gender in the belief-behaviour link: A study within the context of water resources pollution. *J. Environ. Plan. Manag.* **2020**, 63, 2607–2626. [\[CrossRef\]](#)
68. Refsgaard, K.; Magnussen, K. Household behaviour and attitudes with respect to recycling food waste—Experiences from focus groups. *J. Environ. Manag.* **2009**, 90, 760–771. [\[CrossRef\]](#) [\[PubMed\]](#)
69. Listyaningsih, U.; Satiti, S.; Kurniawidi, S.A. *Spatial Poverty of Poverty Alleviation in Bantul Districts of Yogyakarta*; IOP Publishing: Bristol, UK, 2021; Volume 738, p. 012046. [\[CrossRef\]](#)
70. Leadley, S.; Hocking, C.; Jones, M. The ways poverty influences a tamaiti/child's patterns of participation. *J. Occup. Sci.* **2020**, 27, 297–310. [\[CrossRef\]](#)
71. Jakunskiene, E. Assessment of the Impact of Social Responsibility on Poverty. *Sustainability* **2021**, 13, 9395. [\[CrossRef\]](#)