

Original Research

Research on the Influencing Factors of Farmers' Intention to Sort Waste Based on TPB

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Abstract

Improving the efficiency of waste sorting plays a critical role in improving resource utilization efficiency and accelerating green and low-carbon development. Based on the theory of planned behavior (TPB), this study uses structural equation model (SEM) to study the factors that influence 650 farmers' intention to sort waste from the psychological angle of the farmers in Yilan county of Harbin city and Luobei county of Hegang city of Heilongjiang province. Notably, the study confirmed that attitude (ATT), subjective norms (SN) and perceived behavioral control (PBC) can affect farmers' waste sorting intention (INT) significantly and perceived behavioral control is the most important influencing factor of farmers' intention in waste sorting.

Meanwhile, there is a positive correlation between the three factors of farmer's attitude, subjective norm and perceived behavioral control towards waste sorting.

Key words: sort waste, farmers', SEM, influencing factors, the theory of planned behavior

Introduction

With China's rapid population growth, resource consumption and environmental pollution have become increasingly serious [1]. In 2021, the total amount of farmers' waste was 10.89 billion tons, accounting for 38.6% of China's total waste and the production of rural domestic waste was approximately 5.84 billion tons, accounting for 36.11% of China's total domestic waste. In 2022, the total amount of farmers' waste was

9.677 billion tons, accounting for 39.2% of China's total waste and the production of rural domestic waste was approximately 3.274 billion tons, accounting for 34.4% of China's total domestic waste [2]. The random disposal of farmers' waste and the continuous transfer of urban domestic waste to the countryside have led to the gradual deterioration of the rural ecological environment [3]. This not only affects the construction of beautiful countryside, but also seriously restricts the sustainable development of our environment-friendly society [4]. In 2022, the No. 1 Central document proposed to promote green development of agriculture, strengthen comprehensive treatment of non-point agricultural pollution, and promote the sorting and reduction of

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domestic waste at source. Green leads the construction of beautiful villages, which is an important part of the country's implementation of the rural revitalization and the practice of the concept of harmonious coexistence between man and nature [5]. The rural environment is not only related to the construction of beautiful villages, but also to the quality of life of farmers and the high-quality development of rural society [6]. Among the numerous pollution sources that affect the rural environment, rural domestic waste has been one of the main pollution sources in rural areas of China due to its complex sources, structures and components [7]. However, the traditional extensive mixed treatment can no longer achieve the effective treatment and the fundamental improvement of the environment [8]. Therefore, waste sorting is the fundamental method to solve the pollution of rural waste, the critical task of building a new green countryside, and a vital method to improve the life and well-being of farmers.

This paper takes farmers' waste sorting intention as the research object, based on China's national conditions, studies farmers' intention to sort waste from a psychological perspective, explores factors that affect farmers' waste sorting, and then gives play to farmers' main role in waste sorting, effectively solves rural environmental pollution, and realizes rural ecological revitalization.

Literature Review

Research on Laws and Regulations of Waste Sorting

Peng used anylogic platform to construct multi-agent decision function and interaction model, and studied the factors that affect residents' waste sorting intention from the government, residents' and social dimensions. The empirical results show that the construction of waste sorting regulations has the most significant effect on the waste sorting intention, followed by the construction of waste sorting infrastructure [9]. Yue believed that the government, as the propagandist and educator of garbage classification related concepts and methods, not only needs to carry out the propaganda and education of domestic waste sorting concepts, but also needs to formulate waste collection and sorting rules. Thirdly, the government needs to establish a waste sorting responsibility system, define managers, and make waste sorting more specific and practical [10]. In view of the above situation, Ding believed that the government should increase the publicity of waste sorting, develop various marketing methods, so that people can truly feel the benefits of waste sorting, and achieve close interaction between the government and the public [11]. The study found that illegal enterprises can minimize the cost by following environmental protection policies to sort waste. However, the waste sorting policy in many places is difficult for residents to

implement smoothly due to information asymmetry and high ambiguity [12].

Research on Waste Sorting Technology

Nduneseokwou believed that unable to distinguish the types of waste in daily life was an important reason for the difficulty in waste sorting. As it is difficult to ensure the uniformity of waste sorting, waste sorting technology has been a necessary link for the healthy development of environmentally friendly society [13]. Kang confirmed that waste sorting has been a vital issue for environmental protection and resource recovery. The results showed that the sorting accuracy of the system was as high as 99%, and the sorting cycle was as fast as 0.95 seconds [14]. Yang in order to cope with the increasing pollution caused by unsorted waste, waste sorting systems are well-known to people. First, a complex data-enhanced composition is constructed for model training, secondly, a new lightweight neural network garbage classification system WasNet is designed. The accuracy rate on the waste sorting dataset is 82.5% [15]. So, it is of great importance to promote the concept of sustainable development and create a green and environment-friendly social atmosphere for waste classification activities [16].

Research on the Influencing Factors in Waste Sorting

Previous research tended to examine the psychological factors of farmers, suggesting that affective attitudes determine the willingness to sort waste. This view is supported by Barr (2007), who argues that waste sorting behavior is a highly regulated behavior that can be significantly influenced by environmental values, situational characteristics, and psychological factors [17]. Iyer (2007) also agreed that personal environmental knowledge affects one's willingness to participate in waste sorting, and he argues that the more specific knowledge farmers have about waste sorting, the stronger their willingness to participate in waste sorting [18]. Vicente (2008) found that positive attitude towards waste sorting and familiarity with knowledge of waste sorting are important factors influencing farmers' willingness to participate in waste sorting [19]. As the study progressed, Babaei et al. found that the level of waste sorting infrastructure also affects the willingness of farmers to participate in waste sorting [20]. Cardinal found that providing the public with better quality waste sorting facilities is important in motivating them to engage in waste sorting behavior [21]. Strydom (2018) conducted a survey through a representative sample of 2004 respondents in South Africa and found that the main reasons for 74% of respondents not participating in waste sorting were lack of knowledge about waste sorting and few waste sorting facilities [22].

The above literatures show that while researchers have made many achievements in waste sorting,

massive researchers merely extend the TPB from an internal point of view. Thus, there is a need to introduce moderating variables like gender, education and income into TPB to research farmers' intention to sort waste from the psychological perspective of the farmers. Meanwhile, most researchers use mathematical statistical models for waste sorting, there is a need to use TPB to explain farmers' waste sorting intention.

Research Framework and Research Hypotheses

Theoretical Framework

By reading numerous domestic and foreign literature on the influencing factors in waste sorting, based on the previous research foundation, combined with the characteristics of waste sorting, taking the rational behavior theory (TRA) and TPB as the theoretical basis of this manuscript, assuming that farmers' intention in waste sorting are affected by farmers' ATT, SN and PBC.

TPB was proposed by Ajzen, which is a deepening development of TRA and introduces PBC into the theory. This theory has been widely used by scholars because of its operable indicators to measure behavior [23]. Furthermore, it is also a very useful theory because of its robustness in adjusting for different behavior types, sample heterogeneity and method design [24]. Therefore, it is important to conduct research using TPB to better understand the traditional factors associated with behavioral change. As the basic framework for predicting individual behavior intention, TPB plays a vital role in forecasting the factors that influence changes in an individual's conscious behavior.

TPB holds that individual behavior is mainly influenced by individual will, and INT is mainly

influenced by ATT, SN and PBC, and ATT, SN and PBC affect each other. Attitude is the first factor that determines personal intention in TPB. It refers to a person's favorable or unfavorable evaluation of a certain intention, in other words, whether farmers hold a positive or negative attitude towards waste sorting. If farmers with active attitude, then farmers will have a strong desire to sort waste. SN refers to whether a person performs an action depends on the opinions of those who are significant or influential to him/her, which is also affected by the views of social pressure to ac. In other words, external factors have an important influence on whether a person sorts waste. PBC refers to a person's perception of the behavior performance, in other words, it is easy or difficult for farmers to sort waste (Fig. 1).

Hypotheses

Attitude indicates an individual's evaluation of its own behavior results, which is manifested as an individual's feelings, emotions and intentions to external things. Ajzen, who proposed TPB pointed out that the person with positive attitude, the stronger his behavioral intention will be, which will promote his intention to participate. Researchers investigating environmental psychology, consumer psychology and dietary psychology have confirmed that the positive attitude can influence a specific behavior significantly [25]. In this manuscript, we think that when farmers expect to get utility from waste sorting, think that sort waste can protect the environment, they will be willing to pay a certain cost to sort waste.

H1: The attitude of farmers has a positive effect on their waste sorting intention.

SN refers to how a person measures the expectations of "significant others" for particular behaviors. If the person with stronger SN, they are more attentive

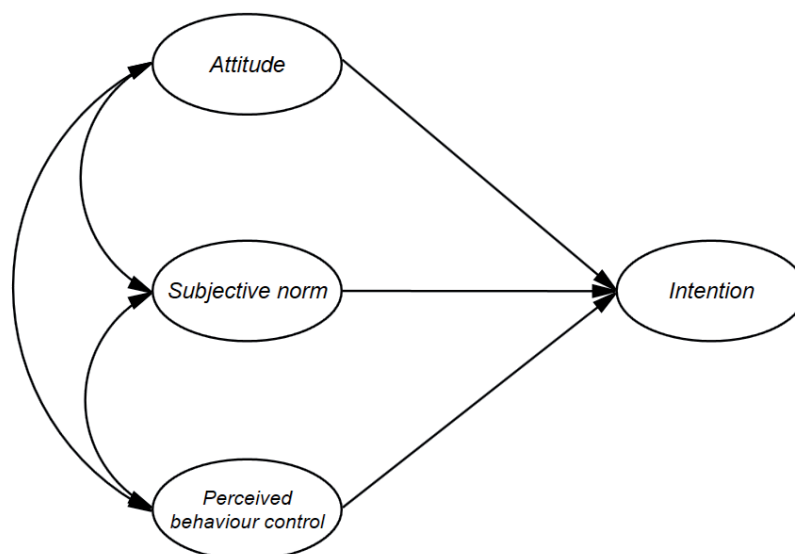


Fig. 1. Theoretical framework of planned behavior.

to the views of those around them, he will easily choose his own behavior according to the suggestions and pressure of people around him. Therefore, SN is a social factor that influences whether a person can do a certain behavior under social and external pressure. In studies of individuals' green environmental behaviors (green living and green consumption), researchers found that SN can actively contribute to the creation of individual behavior intentions [26]. In the study of this manuscript, we believe that although the farmers themselves do not know much about the waste sorting, they will have a good impression based on the views of people around them and will be willing to sort waste.

H2: The SN of farmers has a positive effect on their waste sorting intention.

PBC refers to how a person finds it to engage in a certain behavior, and it reflects an individual's perception of certain specific factors, such as resources, knowledge, ability and time, which can promote or hinder the impact [27]. According to the researchers, the study of pesticide risk label reading by farmers, consumer purchases of organic food and other influences on various behaviors in the field of environmental protection found that PBC can significantly influence behavior intentions and behaviors. This study holds that farmers who understands the concrete knowledge and has enough time, energy and funds to deeply understand waste sorting is easier to sort waste.

H3: The PBC of farmers has a positive effect on their waste sorting intention.

The influencing factors of TPB are independent and interrelated. This paper argues that there is a positive correlation between farmer's ATT, SN and PBC. First, farmers' ATT have a positive impact on both SN and PBC. If the farmers with positive attitude on waste sorting, they will be easier to accept the recommendations of people around them to sort waste and thus improve their own subjective norms. Meanwhile, this positive attitude will also encourage farmers to learn the knowledge related to sort waste, to enhance the perception and behavior control of farmers [28].

Secondly, the SN of farmers have a positive impact on ATT and PBC. The stronger the subjective norms of farmers, it will be more easier to accept the recommendations of others for waste sorting, so that farmers themselves hold a more active attitude on waste sorting. Farmers who are easy to be encouraged by people around them will have more confidence in their knowledge of waste sorting and will be more willing to spend their time and energy in waste sorting.

Finally, PBC of farmers has a active impact on ATT and SN. The stronger the perception and behavior control ability of farmers, that is, the more time, energy and knowledge they have to sort waste, they are more willing to maintain a active attitude on waste sorting, and more likely they are to understand and accept the suggestions of people around them [29].

H4: There is a positive correlation between the positive attitude of farmers towards waste sorting and their SN.

H5: There is a positive correlation between the positive attitude of farmers towards waste sorting and their PBC.

H6: There is a positive correlation between farmers' SN and PBC.

Methodology

Research Methods

Structural Equation Model (SEM) developed by Sewall, which is a very effective method in social science research [30]. With its complete linear statistical modeling technology, this model is widely used in the research of economic and behavior. This model combines factor analysis, correlation analysis and regression analysis. It can not only deal with unobserved latent variables, but also can analyze and study the direct and indirect effects between variables, as well as the size and direction of the effects. SEM deals with complex statistical data by specific statistical means, and evaluates empirical results according to the matching degree between model data and actual data.

In essence, this manuscript is a quantitative study, and the object is practical research. This paper studies the relationship between farmers' ATT, SN and PBC and their intention to sort waste. Because ATT, SN and PBC are latent variables that cannot be measured, it is not appropriate to use traditional multiple linear regression and logistic regression methods. Compared with the traditional regression model, the SEM has the advantages that analyze multiple dependent variables, estimate the factor structure and factor relationships, and estimating the overall model fit. Therefore, we use SEM for the empirical analysis of this manuscript.

SEM should be decomposed into structural models and measurement models. The measurement model:

$$x = \Lambda_x \xi + \delta$$

$$y = \Lambda_y \eta + \varepsilon$$

The structural model:

$$\eta = B\eta + \Gamma\xi + \zeta$$

Questionnaire Design

The questionnaire consists of three parts in total. The first part is a short description of the questionnaire that contains the purpose, intention, and notes of the questionnaire.

The second part is the demographic characteristics of farmers that involves gender, household size, annual

household income, source of household income, education, total household expenditure, sort waste attention degree, time of agricultural planting, age, area of agricultural planting, whether to sort waste, and sort waste sorting has been implemented.

The third part sets the seventeen questions of the questionnaire based on the four elements of attitudes, subjective norms, perceived behavioral control, and behavioral intention proposed by the theory of planned behavior discussed in the theoretical framework.

In terms of attitudes, referring to the paper published by Lin et al [31], which contains six question items: Questions 1: Waste sorting helps accelerate green and low-carbon development. Questions 2: Waste sorting helps improve resource utilization efficiency. Question 3: Waste sorting helps prevent environmental quality deterioration. Questions 4: Waste sorting helps improve the quality of green life. Questions 5: Waste sorting contributes to the coordinated development of human and environment. Questions 6: Waste sorting helps maintain ecological balance.

In terms of subjective norms, referring to the paper published by Wei et al [32], which contains four question items: Questions 1: The government's publicity of waste sorting will affect me. Questions 2: The recognition degree of waste sorting in the society will affect me. Questions 3: My family's participation in waste sorting will affect me. Questions 4: Opinions of relatives and friends on waste sorting will affect me.

In terms of perceived behavioral control, referring to the paper published by Adnan et al [33], which contains four question items: Questions 1: I have the economic strength to sort waste. Questions 2: I have the energy to sort waste. Questions 3: It is easy for me to sort waste. Questions 4: I have garbage classification knowledge to sort waste.

In terms of behavioral intention, referring to the paper published by Lou et al [34], which contains three question items: Questions 1: I am willing to sort waste. Questions 2: I will help my relatives and friends sort waste. Questions 3: I will continue to pay attention to the information of sort waste.

Survey Location and Sample Selection

The research sites of this paper are Yilan county, Harbin city, Heilongjiang province and Luobei county, Hegang city. Yilan county is located in the middle Heilongjiang and total area is 4672 square kilometers, and the total population is 390000. Luobei county belongs to Hegang city, Heilongjiang province and locates in the northeast of Heilongjiang province, with a total area of 6784 square kilometers and a total population of 230000. Both of them have unique advantages in developing agricultural production, but in the process of social development, the waste discarded by farmers has caused serious environmental damage. On the one hand, waste discarded by farmers in Luobei county and Yilan county becomes a source of disease

transmission, jeopardizing the health of farmers [35]. On the other hand, waste discarded by farmers in Luobei county and Yilan occupies land and destroys soil, water systems, groundwater and natural landscapes, seriously affecting the lives of farmers and agricultural production. Non-biodegradable substances, such as plastic bags, have a residual rate of up to 20-30% in the land, and this white pollution seriously damages the soil structure and jeopardizes the state of biological survival and agricultural production [36].

In recent years, Yilan county and Luobei county have placed ecological environment protection and pollution control at an important position, in which waste sorting is a key step. They have actively implemented the Special Rules for the Implementation of Air Pollution Prevention in Heilongjiang Province, relevant waste sorting regulations and punishment measures have been introduced, while the rich rural environmental protection publicity and mobilization activities and the perfect domestic waste treatment system have been constantly improved. Under the above measures, the ecological environment has been greatly improved, through relevant government measures, air quality in Luobei county and Yilan county continues to improve, surface water environmental quality steadily improves, and agricultural water quality as a whole continues to improve [37]. Soil environmental risks in Luobei county and Yilan county have been basically controlled, and the trend of aggravation of soil pollution has been initially curbed. The safe utilization rate of contaminated arable land has been stabilized at more than 90 percent, and the soil environmental condition of agricultural land is generally stable [38]. Meanwhile, the government's policies related to waste sorting can help farmers in these two places better understand the relevant knowledge and benefits of waste sorting, and also greatly promote the waste sorting behavior of farmers in these two places. We believe that the research conducted in these two places is more representative, so Yilan county and Luobei county are selected as the research sites.

The research samples are farmers in Yilan county, Harbin city and Luobei county, Hegang city, Heilongjiang province. In Yilan County, three townships with a large number of farmers and a perfect waste sorting system were selected for the study. Through field visits and consulting relevant materials, Yilan town, Sandaogang town and Dalianhe town were selected as research areas. However, Luobei County, relatively selects two villages and towns with moderate number of farmers and complete waste sorting system for research. Through field research and online telephone interview, Taipinggou town and Hebei town were selected as the research areas. Because Yilan county in Harbin city and Luobei county in Hegang city belong to small rural counties in China, the scope of the towns is small and the mobility is small, so we take the towns as the unit for investigation. The sample size for the total sample was then determined based on the population of each town.

The collection of questionnaire materials was carried out from January 10, 2023 to April 30, 2023. As waste sorting is a spontaneous behavior of farmers, it is necessary to conduct a field investigation. To ensure the authenticity of the questionnaire, before the formal survey, we explained the purpose of the questionnaire survey and explained the measurement items to all participating farmers, ensuring that the questionnaires were filled out anonymously and that the research data were used only for academic research. We distributed 650 questionnaires by random sampling for investigation, and finally recovered 620 questionnaires, after excluding invalid questionnaires with unrealistic answers, 595 questionnaires were used, with an effective rate of 91.53%.

Results and Discussion

Reliability and Validity Test

Reliability refers to the consistency of the data. Cronbach's alpha can be used to test the reliability. When $\alpha \geq 0.7$, the overall reliability of the data is reasonable. This manuscript uses SPSS.26 software for measurement, the alpha values of ATT, SN, PBC and INT in this study were measured to be 0.943, 0.923, 0.920 and 0.923 respectively. Meanwhile, the alpha value of the overall model was 0.976. Therefore, it can be considered that the reliability of the scale is acceptable (Table 1).

Validity analysis refers to the analysis of the accuracy of the scale, it includes construct validity and convergent validity. This manuscript uses SPSS.26 software for measurement. The KMO statistics in this study are all greater than 0.7, among which the KMO values of ATT, SN, PBC and INT are 0.919, 0.830, 0.839 and 0.754, respectively, and the P values are all less than 0.05, showing that the structural validity is good (Table 1).

The CR values are all greater than 0.7, of which the CR values of ATT, SN, PBC and INT are 0.943, 0.924, 0.920 and 0.925 respectively, and the AVE values in all structures are greater than 0.5, of which the AVE values of ATT, SN, PBC and INT are 0.735, 0.752, 0.743 and 0.804 respectively, showing that the model has good convergence validity (Table 1).

Fitness Test

Model fitness refers to the evaluation of the fitting effect between the hypothetical and the data. Amos model contains many model fitting indexes, of which the most commonly used are absolute fitting index and relative fitting index. The former includes chi-square and RMSEA, as for chi-square index, Nasser et al. believed that RMSEA value less than 0.08 indicated that the model fit was acceptable, and pointed out that the relative fit index included NFI, RFI, CFI, IF and TLI are greater than 0.9 indicate a good degree of model fitting.

In this manuscript, the software AMOS.26 is used for calculation. The values of chi-square/dF are 3.884,

Table 1. Results of reliability and validity.

Constructs	Item	Alpha	KMO	P value	Std.	CR	AVE
Attitude	ATT1	0.943	0.919	0.000	0.809	0.943	0.735
	ATT2				0.879		
	ATT3				0.865		
	ATT4				0.871		
	ATT5				0.873		
	ATT6				0.845		
Subjective norm	SN1	0.923	0.830	0.000	0.854	0.924	0.752
	SN2				0.872		
	SN3				0.889		
	SN4				0.854		
Perceived behaviour control	PBC1	0.920	0.839	0.000	0.867	0.920	0.743
	PBC2				0.842		
	PBC3				0.875		
	PBC4				0.863		
Behavior intention	INT1	0.923	0.754	0.000	0.917	0.925	0.804
	INT2				0.902		
	INT3				0.870		

Table 2. Assessment of fitness.

Fit index	Value	Acceptable value
Chi-square/df	3.884	<5
RMSEA	0.070	<0.08
NFI	0.961	>0.9
RFI	0.953	>0.9
CFI	0.970	>0.9
IFI	0.971	>0.9
TLI	0.964	>0.9

less than 5, the values of RMSEA are 0.070, less than 0.8, the values of NFI, RFI, CFI, IFI and TLI are 0.961, 0.953, 0.970, 0.971, 0.964, respectively, which are all greater than 0.9. It shows that the model of this paper fits well (Table 2).

Hypothesis Test

In this manuscript, the software AMOS.26 is used for calculation, and the first six hypotheses are all significant at the 0.05 level, that is, hypothesis H1-H6 are accepted (Table 3). This study concludes that the ATT, SN and PBC of farmers have a positive effect on their participation in waste sorting. As shown in Table 3, PBC has the largest positive impact on farmers' participation in waste sorting, followed by SN, and farmers' attitude has the weakest positive effect. When the PBC of farmers increases by 1 standard deviation, the INT of farmers to sort waste will increase by 0.419 standard deviation. The behavior intention to sort waste will increase by 0.407 standard deviation for every one standard deviation increase in SN of farmers. However, for every one standard deviation increase in the positive attitude of farmers towards sorting waste, their INT to sort waste only increases by 0.149 standard deviation.

As shown in Table 3, the Pearson coefficient between attitude of farmers towards waste sorting and their SN is 0.915, and the Pearson coefficient between attitude of farmers towards waste sorting and their PBC is 0.927. The Pearson coefficient between farmers' SN and PBC is 0.938. Pearson correlation coefficient both are positive

numbers, there is a positive correlation between the three influencing factors of farmers' intention to sort waste.

Discussion

Results Analysis

(1) The influence of ATT on farmers' intention to sort waste.

The results indicate that the attitude of farmers has a positive effect on their intention to sort waste (estimate = 0.178, P values = 0.035, C.R. = 2.113), therefore, H1 is accepted. The results show that the change of farmers' attitude can significantly predict their intention. as a result, the result is acceptable. Meanwhile, this paper emphasizes the positive influence of individual's positive attitude towards a certain behavior on individual's behavioral intention and points out that it is very important for farmers to have an active attitude on waste sorting.

(2) The influence of SN on farmers' intention to sort waste.

The findings indicate that the subjective norm of farmers has a positive effect on their intention to sort waste (estimate = 0.489, P values<0.001, C.R. = 4.786), therefore, H2 is accepted. The findings emphasize again the active influence of individual SN on individual behavioral intention, and point out that the views of people around and social pressure have a very important influence on the choice of whether farmers waste sorting.

It reinforces the consequent that farmers can easily follow social pressures and the expectations of families to change their behavior intentions to sort waste.

(3) The influence of PBC on farmers' intention to sort waste.

The findings indicate that the PBC of farmers has a positive effect on their intention to sort waste (estimate = 0.499, P values<0.001, C.R. = 4.422), therefore, H3 is accepted. The findings also provide sufficient support for the positive effect of PBC on the behavior intention of farmers to sort waste. It confirms that farmers' understanding of the concrete knowledge and the government's help to farmers' waste sorting have a vital effect on farmers' intention and believes that PBC

Table 3. Results of unstandardized confirmatory factor analysis.

Hypothesis	Path	Estimate	P value	C.R.	Significance
H1	ATT→INT	0.149	0.035	2.113	Supported
H2	SN→INT	0.407	***	4.786	Supported
H3	PBC→INT	0.419	***	4.422	Supported
H4	ATT ↔ SN	0.915	***	13.963	Supported
H5	ATT ↔ PBC	0.927	***	14.104	Supported
H6	SN ↔ PBC	0.938	***	14.243	Supported

is the most important influencing factor of farmers' intention in waste sorting.

(4) Correlation of ATT, SN and PBC

The findings indicate that there is a positive correlation between farmers' positive attitude towards waste sorting and their SN and PBC (Estimate = 1.866, P Values < 0.001, C.R. = 13.963. Estimate = 1.909, P Values < 0.001, C.R. = 14.104). There is also a positive correlation between the SN of farmers and their PBC in participating in waste sorting (Estimate = 1.866, P Values < 0.001, C.R. = 13.963). Therefore, H4-H6 are accepted, and the correlation is significant. This study believes that farmers with positive attitude, the more sensitive they are to the expectations of their families, and the easier they are to receive the recommendations of people about waste sorting. Meanwhile, the positive attitude towards waste sorting also encourages farmers to learn the knowledge related to sort waste, which will inevitably improve the perception and behavior control of farmers. Under the pressure of external evaluation and expectation, farmers who are under great pressure will learn the knowledge related to sort waste and do their best to create the conditions necessary for waste sorting, so their PBC will be improved.

Theoretical Contributions and Practical Significance

The theoretical contributions: (1) Previous research on waste sorting has mostly focused on econometric models, this study investigates the waste sorting behavior of farmers from the perspective of TPB, combined with structural equation modeling which offers a more general understanding of the determinants of farmers' waste sorting intention and expands the existing interpretation mechanisms and has important reference for future research on TPB. (2) The existing studies on farmers' waste sorting intention mostly focus on technological innovation and the research from the angle of psychology are insufficient. The study takes farmers as research objects, which bridges the gap in the field of waste sorting research and provides a more comprehensive framework for future research on waste sorting.

The practical significance: (1) Firstly, farmers' PBC have a significant positive effect on their waste sorting intention. Thus, policy makers should publicize the profits in several methods to make individuals aware of the significance of waste sorting in the sustainable development of environment. Meanwhile, policy makers should take the lead in waste sorting activities and pay more attention to the "bottom-up" power, take corresponding measures according to the characteristics and needs of different villages, and leverage the autonomy of grassroots organizations and farmers. (2) Finally, farmers' SN have a significant positive effect on their waste sorting intention. Therefore, policy makers should improve infrastructure construction and provide convenient conditions and services for waste sorting of farmers. In the long run, fostering civilized lifestyles

and actively developing the participatory role of non-governmental organizations are also necessary conditions for creating a long-term mechanism for waste sorting.

Conclusions

This paper uses SEM to study the factors that influence 650 farmers' intention to sort waste from the psychological perspective of the farmers. The conclusions are as follows: (1) The ATT of farmers has a positive effect on their intention in waste sorting, but the impact is not significant. (2) The SN of farmers has a significant positive effect on their intention in waste sorting. (3) The PBC of farmers has a significant positive effect on their intention in waste sorting. (4) There is a positive correlation between the ATT, SN and PBC of farmers towards waste sorting.

Finally, although this paper is an exploratory study, there are still certain shortcomings: (1) The types of influencing factors of farmers' waste sorting are not comprehensive enough, and more comprehensive influencing factors, such as farmers' habits and values, need to be considered in the future research process to make the study more complete. (2) All data received for the study are self-reported by the farmers, and the sample data can not completely eliminate its effect of common method bias. Future studies may consider paired data or further validation of the findings through experimental research methods. (3) Because of the time and economic costs involved in this study, as well as the limitations of farmers not being able to conduct online research and web-based questionnaires, the scope of the research covered in this paper was very limited. In future research, the scope of the study will be enlarged so that the sample coverage will be richer and not only limited to farmers in Heilongjiang Province. In the future, the actual situation of each region will be carried out to make the empirical research more abundant, which is of great practical significance for the improvement of the environment in rural areas in China.

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Conflict of Interest

The authors declare no conflict of interest.

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