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Push or Pull? The Dual Forces of Environmental Policies and Social Networks on Farmers' Green Production Behavior

Linli Jiang[1,a,*], Wei Hou[1,b], Surong He[1,c]

[1]*School of Economics and Management, Wuyi University, Jiangmen, China*
[a]*jianglinli1225@126.com,* [b]*18316113317@163.com,* [c]*1608588266@qq.com*
**Corresponding author*

Abstract: *Green production is a mode of production to achieve resource conservation, reduce ecological environment pollution and sustainable agricultural development. It is crucial to promote sustainable agricultural development, ensure food safety for consumers and maintain rural ecological balance. The results show that: (1) Agricultural environmental policies play a pivotal role in influencing farmers' green pest management practices. (2) Rural social networks are a crucial factor affecting farmers' rational fertilization practices. (3) Value identification plays a significant mediating role in the impact of public participation-based environmental policies on green pest management practices and in the influence of social networks on rational fertilization practices.*

Keywords: *Environmental Policy; Social Networks; Green Production Behavior*

1. Introduction

Green production refers to sustainable agricultural practices achieved through appropriate field management and cultivation techniques, ensuring resource conservation, reduced ecological contamination, and sustainable agricultural development. Such practices are crucial for advancing sustainable agriculture, safeguarding consumer food safety, and maintaining rural ecological balance [1]. In the past, agricultural growth often relied on intensive resource inputs, which increased ecological degradation and agricultural non-point source pollution [2]. Against the backdrop of global agricultural transformation toward sustainability, China has increasingly emphasized green agricultural development through policies aimed at resource conservation, and safer agricultural production. As the direct decision-makers and implementers of agricultural activities, farmers play a central role in this transition. From the perspective of behavioral economics and psychology, farmers' decisions are constrained by cognitive differences and information access. Better access to green production information can enhance environmental awareness and increase the likelihood of adopting green practices [3].

However, although previous studies have examined policy, social networks, and cognition separately, limited attention has been paid to how agricultural environmental policies and rural social networks jointly shape farmers' green production behavior. To address this gap, this study investigates the combined effects of these top-down and bottom-up mechanisms on farmers' green production decisions in China, with the aim of enriching the understanding of farmers' behavioral responses and providing insights for green agricultural policy design in developing regions.

2. Theoretical framework and the hypotheses

Based on institutional theory, social network theory, motivation crowding theory, and the theory of planned behavior, this study examines how agricultural environmental policies and rural social networks influence farmers' green production behaviors. Specifically, it analyzes both their direct effects and their indirect effects through value identification (VR), while considering agricultural environmental policies and rural social networks as formal and informal institutional factors, respectively.

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2.1 Impact of Agricultural Environmental Policies on Farmers' Green Production Behaviors

Institutional economics suggests that institutions are fundamental determinants of economic activities and can be classified into formal and informal institutions. Formal institutions refer to written rules consciously created and formally established through organizations such as the state, whereas informal institutions are binding rules gradually formed through long-term social interactions and recognized by society. Following common classifications of environmental policies according to their influence on farmers' behavior, this study focuses on two policy categories widely used in rural China: voluntary incentive-based measures (VIBM) and awareness-increasing measures and private initiatives (AIMAPI).

VIBM influence farmers' behavior by providing financial incentives for pollution reduction or environmentally friendly practices, or by increasing the price of polluting inputs; they are commonly regarded as "economic instruments" [4]. Existing studies generally suggest that VIBM positively affect farmers' green production behaviors, as government tax incentives and financial subsidies can promote the diffusion of environmentally friendly agricultural technologies. AIMAPI are intended to promote environmental quality objectives and sustainable agricultural systems. Compliance is voluntary, and these programs seek to raise farmers' awareness of how current practices contribute to environmental problems and how improved management practices can mitigate them. Based on this, the following hypotheses are proposed:

H_1a: Voluntary incentive-based measures (VIBM) positively influence farmers' green production behaviors.

H_1b: Awareness-increasing measures and private initiatives (AIMAPI) positively influence farmers' green production behaviors.

2.2 Impact of Rural Social Networks on Farmers' Green Production Behaviors

Informal institutions refer to socially accepted behaviors and rules that gradually develop through long-term social interactions. In rural China, where social governance often involves uncertainty, dispersion, and complexity, relying solely on formal institutions while neglecting existing social structures may lead to unbalanced governance outcomes. In this context, rural social networks function as important informal institutions and serve as vital channels for the diffusion of technological information [5].

Existing studies suggest that farmers often discuss and learn about new green production technologies through their internal relationship networks, which accelerates the spread of such information within rural communities [6]. These networks are usually rooted in kinship, shared experiences, and unwritten social norms. In addition, social networks can promote farmers' green production by influencing their behavioral attitudes and perceived effects of green production.

Rural social networks can generally be divided into two types: individual-based and group-based networks. Individual-based networks are built on personal ties, mutual trust, and reciprocal obligations, enabling farmers embedded in such networks to access broader social resources. Group-based networks, by contrast, are formed around shared interests, common rules, and organized participation, giving members a stronger sense of belonging and identity. Given the differences in their operating mechanisms, these two types of social networks may have distinct effects on farmers' green production behaviors. Based on this, the following hypotheses are proposed:

H_2a: Individual-based social networks positively influence farmers' green production behaviors.

H_2b: Group-based social networks positively influence farmers' green production behaviors.

2.3 The Mediating Role of Value Identification

Both environmental policies and social networks are envisioned to convey information and value principles related to green development, either directly or indirectly [7]. The aim is to enhance farmers' understanding and endorsement of green production practices. In essence, environmental policies and social networks might impact green farming behaviors through the mediating effect of value identification. On one hand, existing research has confirmed the significant influence of environmental policies on farmers' perceptions. For instance, government measures like environmental protection, governance campaigns, and increased subsidies can amplify farmers' awareness and adoption of green

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practices. On the other hand, social networks, a unique form of social environment, serve as avenues for farmers to acquire knowledge and rectify cognitive biases. Interpersonal trust within these networks can lead to more accurate and easily accepted information [8]. This acceptance aids farmers in understanding energy-saving and emission-reducing technologies in farming.

It's noteworthy that motivations can either be external or intrinsic. Value identification is an external manifestation of internal motivation, a collective understanding of the worth and meaning of a specific concept or practice. When farmers' understanding of green production aligns economically and culturally with broader societal values, this internalization gets reflected in their tangible green practices. Drawing from the Theory of Planned Behavior (TPB), one's cognition of an entity can directly or indirectly affect their behavioral intentions, a paradigm frequently analyzed in psychology [9]. Hence, the deeper the farmers' identification of value importance, the stronger their intention to adopt specific technologies. With the aforementioned rationale, this study proposes the following hypotheses:

H_3a: Value identification mediates the relationship between environmental policies and farmers' green production behaviors.

H_3b: Value identification mediates the relationship between social networks and farmers' green production behaviors.

Based on the analysis, the theoretical analysis framework is constructed as shown in Figure 1.

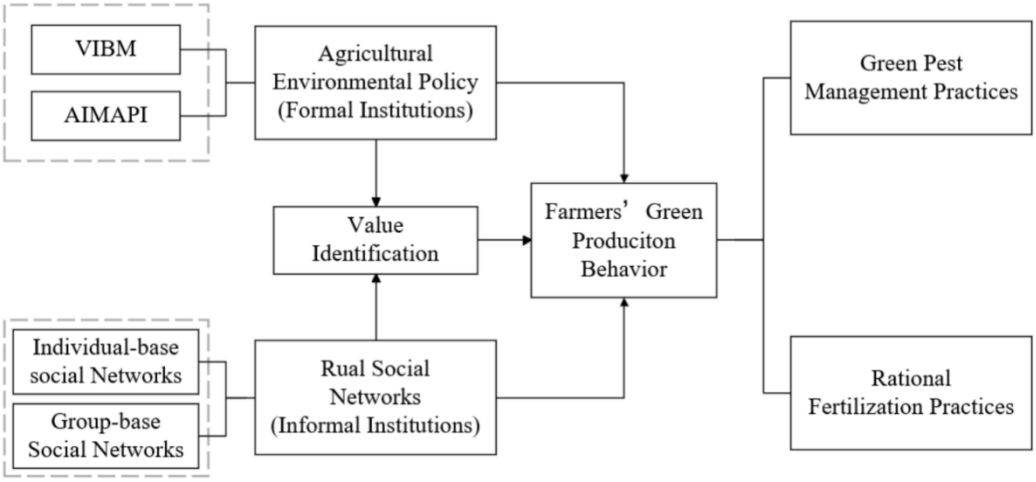

Fig. 1. Theoretical analysis framework.

3. Research design

3.1 Sampling and Data Collection

Zhijiang City in Hubei Province was selected as the study area due to its favorable conditions for rice cultivation and its active implementation of green agricultural policies. In recent years, the local government has promoted the use of organic fertilizers, biological pesticides, and other green production measures, making the area representative for studying rice farmers' green production behaviors.

From July to October 2021, a field survey was conducted in three townships of Zhijiang. In each township, 2-3 villages were selected, and 30-40 farmers were surveyed per village. Of the 308 questionnaires distributed, 284 were valid, with an effective response rate of 92.21%. Face-to-face interviews were used to collect information on household characteristics, farming practices, environmental policies, social networks, value identification, and green production behaviors.

3.2 Measurements and the Instruments

3.2.1 The Dependent Variable

This study examines farmers' green production practices from two dimensions: green pest management practices (GPMP) and rational fertilization practices (RFP). Green pest management

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practices, also known as integrated pest management (IPM), refer to resource-saving and environmentally friendly pest control methods that can reduce the use of chemical pesticides and improve both economic and environmental outcomes [10]. Rational fertilization practices refer to appropriate fertilization measures adopted during crop cultivation, including the combined use of organic and inorganic fertilizers.

3.2.2 The Key Independent Variable

This study focuses on agricultural environmental policies and rural social networks as the core explanatory variables. Environmental policies, as formal institutional mechanisms, are categorized into those that guide farmers' VIBM through direct subsidies and government promotion programs, and those that steer farmers' AIMAPI through means like publicity and training. On the other hand, social networks, representing informal mechanisms, are divided into individual-based social networks formed on the grounds of kinship, friendship, and locality, and group-based social networks established upon rural social groups.

3.2.3 Mediating Variable

Farmers' value identification of sustainable agriculture mediates the relationship between environmental policies, social networks, and their green production behavior. In the design of the questionnaire, we assessed farmers' value identification specifically focusing on their appreciation for both safety and environmental values.

3.2.4 Control Variable

Based on existing research, this study selects individual characteristics and family production and operational features as control variables. Individual characteristics include gender, age, education level, and years of farming experience, while family production and operational characteristics consider aspects such as distance to the township, number of agricultural workers, the proportion of agricultural income, and participation in cooperatives.

3.3 Model Specification and Estimation

3.3.1 Bivariate Probit Model

The bivariate probit model is used to estimate the correlation between two binary outcome variables. Compared with the standard probit model, it allows for the possible dependence between two binary decisions.

Farmers face two distinct decisions: whether to adopt green pest control techniques and whether to use rational fertilization methods. These two behaviors among farmers tend to be interconnected, with unobservable variables in real-world scenarios influencing both decisions simultaneously. To account for this interconnectedness and address potential biases arising from these latent factors, a Bivariate Probit Model is employed. This model is used to study how environmental policies and social networks impact a farmer's choice to engage in green pest control and rational fertilization practices. The model is configured as follows:

$$y_1^* = \alpha_1 X + \beta_1 Z + \varepsilon_1 \tag{1}$$

$$y_2^* = \alpha_2 X + \beta_2 Z + \varepsilon_2 \tag{2}$$

$$y_1 = \begin{cases} 1, y_1^* > 0 \\ 0, y_1^* < 0 \end{cases} \tag{3}$$

$$y_2 = \begin{cases} 1, y_2^* > 0 \\ 0, y_2^* < 0 \end{cases} \tag{3}$$

$$E(\varepsilon_1) = E(\varepsilon_2) = 0 \tag{4}$$

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$$Var(\varepsilon_1) = Var(\varepsilon_2) = 1 \tag{5}$$

$$Cov(\varepsilon_1, \varepsilon_2) = \rho \tag{6}$$

In equations (1)-(4), variables y_1 and y_2 represent a farmer's decision regarding the adoption of green pest control and rational fertilization techniques, respectively. Specifically, y_1 =1 denotes the adoption of green pest control methods, while y_1 =0 signals its non-adoption. Similarly, y_2 =1 indicates a choice for rational fertilization, whereas y_2 =0 signifies its non-adoption. Variables y_1* and y_2* stand as latent factors. The variable X serves as the central explanatory variable, focusing on agricultural environmental policies and the farmer's social ties. Variable Z functions as a control, influencing the overall process. Coefficients α_1, α_2, β_1 and β_2 are yet to be estimated. The ε is the disturbance term, adhering to the conditions specified in equations (5)-(7).

3.3.2 Mediation Effect Model

This paper will draw upon the methods proposed by Zhonglin Wen and colleagues to investigate the mediating effects of agricultural environmental policies and rural social networks on the green production behavior of farm households [11].

4. Results

4.1 Multicollinearity diagnosis

To ensure the stability and accuracy of the Bivariate Probit model, the Variance Inflation Factor (VIF) was employed to test for multicollinearity. The test results indicate a maximum VIF of 3.56 and a minimum of 1.52, all of which are below the threshold of 10. This suggests that there is no significant multicollinearity among the explanatory variables in the model, making the Bivariate Probit model suitable for regression analysis.

4.2 Baseline Regression Analysis

Stata 16.0 software was utilized to estimate the influence of social capital on farmers' current and sustained adoption behaviors of conservation tillage techniques using a Bivariate Probit model. The results are presented in Table 1. Specifically, Model (I) assesses the impact of environmental policies and social networks on farmers' green pest control behaviors and rational fertilization practices. Overall, the model exhibits a satisfactory fit. The p-values from the Wald test are all below 0.05, leading to a strong rejection of the null hypothesis that the correlation coefficient ρ is zero, which indicates a pronounced correlation between the two dependent variables: farmers' green pest management practices and their rational fertilization practices. Therefore, the choice of the Bivariate Probit Model is justified.

4.2.1 The impact of environmental policies and social networks on farmers' green pest management practices

From the results in Table 1 of Model (I), it's evident that public participation-oriented environmental policies have a significant positive influence on farmers' green pest management practices at a 10% significance level. This implies that such policies significantly promote the adoption of farmers' green pest management practices, thus confirming hypothesis H_1b. Conversely, the results indicate that economic incentive-based environmental policies have a notable negative impact on these behaviors. Moreover, the two types of social networks examined didn't exhibit any significant influence on farmers' green pest control actions.

Considering the control variables, age has a significant negative effect on the adoption of green pest control behaviors by farmers. As farmers age, they become less inclined to adopt these green practices, which can be attributed to the limitations that come with old age, including physical capacity, cognitive functions, and the ability to learn new technologies. The distance from the nearest town also has a negative effect, suggesting that the farther farmers are from the town center, the less likely they are to adopt green pest management technology. This may be because most agricultural extension centers and town governments are located in towns, so farmers living farther away have fewer opportunities to access green pest control training. Lastly, the number of agricultural laborers in a farmer's household has a negative impact on their green pest control behaviors. Households with more agricultural labor

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tend to rely on traditional methods, such as manual fertilization and pest control, perhaps because they have more available workers.

4.2.2 The impact of environmental policies and social networks on farmers' rational fertilization practices

Based on the findings from Model (I), the level of participation in social groups significantly influences farmers' rational fertilization behaviors at a 10% significance level, and the coefficient is positive, which indicates that a higher degree of participation in social groups can notably encourage farmers to adopt rational fertilization methods, validating hypothesis H_2a. On the other hand, the closeness of relationships with friends and relatives significantly affects these behaviors at a 5% significance level, with a negative coefficient, which suggests that farmers who have closer ties with their friends and relatives are less inclined to practice rational fertilization.

4.3 Robustness Test

To verify the robustness of our estimation results, we re-examined the experimental data using alternative models and varying sample sizes, with the results presented in Table 1. Models (II) and (III) employ a binary Logit model to assess the impact of environmental policies and social networks on farmers' adoption of green pest management practices and rational fertilization practices. Compared to Model (I), although there are differences in the magnitude of coefficients for environmental policies and social networks in Models (II) and (III), the directions of influence are consistent with the bivariate Probit model, and they pass significance tests. The conclusions remain consistent even after changing the model, confirming the robustness of our baseline regression results.

4.4 Mediation Effect Analysis

4.4.1 Mediation effect of value identification on the influence of environmental policy and social networks on farmers' green pest management practices

Based on the results from Table 1, the mediation effect of value identification in the influence of environmental policies and social networks on green pest management practices was ascertained using a three-step test method in Models (IV), Models (V) and (VI). It was found that value identification partially mediates the effect of public participation-type environmental policies on green prevention behavior, while there's no significant mediation effect for economic incentive-type environmental policies. Additionally, no significant mediation effect exists in the influence of social networks on green pest management practices.

4.4.2 Mediation effect of value identification on the influence of environmental policy and social networks on farmers' rational fertilization practices

According to Table 1, for the influence of environmental policy and social networks on rational fertilization practices, value identification serves as a mediator. Through a three-step test, it was discerned that value identification fully mediates the influence of the degree of participation in social groups on rational fertilization practices. Conversely, it partially mediates and mitigates the negative impact of close interactions with friends and relatives on rational fertilization practices. However, there's no significant mediation effect in the influence of environmental policy on rational fertilization practices.

Table 1 Regression results

Variables	Model (Ⅰ)		Model (Ⅱ)	Model (Ⅲ)	Model (Ⅳ)	Model (Ⅴ)	Model (Ⅵ)
	GPMP	RFP	GPMP	RFP	VR	GPMP	RFP
VIBM	-0.1260* (0.0730)	0.0961 (0.0928)	-0.2220* (0.1250)	0.2143 (0.1918)	0.0112 (0.0083)	-0.0496** (0.0254)	0.0150 (0.0160)
AIMAPI	0.1529* (0.0846)	0.0627 (0.1038)	0.2760** (0.1420)	0.0453 (0.2181)	0.0299*** (0.0096)	0.0482* (0.0299)	-0.0011 (0.0189)
GBSN	0.0472 (0.07239)	0.1717* (0.1185)	0.0900 (0.1270)	0.3641* (0.2247)	0.0265*** (0.0084)	0.0081 (0.0262)	0.0190 (0.0165)
IBSN	0.0737 (0.0966)	-0.2438** (0.1236)	0.1250 (0.1570)	-0.4968** (0.2560)	0.0385*** (0.0107)	0.0135 (0.0333)	-0.0486** (0.0210)
VR	—	—	—	—	—	0.3163* (0.1851)	0.1862* (0.1168)
Constant	-0.0150 (0.4654)	2.1881*** (0.4781)	controlled	controlled	0.7682*** (0.0514)	0.2700 (0.2116)	0.8387*** (0.1336)
Prob>chi2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

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N	284	284	284	284	284	284	284

Note.
a. SEs in parentheses.
b. *p<.05, **p<.01, ***p<.001.

5. Discussion and conclusion

Based on the empirical results, the following conclusions are drawn. First, agricultural environmental policies play an important role in shaping farmers' green pest management practices. Specifically, public participation-based environmental policies significantly promote green pest management practices, whereas economic incentive-based environmental policies have a significant negative effect. Second, rural social networks are an important factor influencing farmers' rational fertilization practices. In particular, participation in group-based social networks significantly promotes rational fertilization practices, while close interactions with friends and family have a significant negative effect. Third, value identification plays a significant mediating role in the effect of public participation-based environmental policies on green pest management practices and in the relationship between social networks and rational fertilization practices, whereas no significant mediating effects are found in other pathways.

Regarding the role of environmental policies, the shift from traditional pesticide use to green pest management requires farmers to acquire more knowledge and skills, while also bearing higher technical costs and risks. Under such conditions, economic subsidies alone may be insufficient to promote effective adoption. By contrast, training and on-site guidance can improve farmers' understanding and practical ability, thereby increasing their willingness to adopt green pest management technologies. The insignificant effect of environmental policies on rational fertilization practices may reflect insufficient policy attention and investment in this area.

With respect to social networks, no significant effect is found on green pest management practices, possibly because these technologies are relatively scientific, systematic, and complex, making them difficult to learn through ordinary interpersonal interactions. In contrast, group-based social networks significantly promote rational fertilization practices. A possible explanation is that farmers embedded in close personal networks often share similar information sources and may also face competitive pressures, reducing their willingness to exchange knowledge and experience related to green production.

As for the mediating role of value identification, the results suggest that training and guidance from village committees and agricultural technicians can strengthen farmers' recognition of the ecological and practical value of green production, thereby encouraging green pest management practices. Value identification also helps mitigate the negative effect of close personal interactions on rational fertilization practices. However, no significant mediating role is found for environmental policies in rational fertilization practices, which may be related to the limited intensity and broad nature of government promotion in this field.

6. Policy implications

The findings of this study can offer a foundation for government decision-making to further promote farmers' green pest management practices and rational fertilization practices. Firstly, the government should consider local conditions holistically, adhere to farmer demand-driven approaches, and intensify targeted, comprehensive promotion on the economic, social, and ecological benefits of green production practices. It's imperative to guide farmers towards actively evaluating green pest management, rational fertilization, and other green production technologies. Encouraging farmers to participate in training sessions for green pest management and fostering regular technical exchanges between farmers and agricultural extension workers or experts can enhance the intrinsic motivation for green production among farmers. Secondly, policy subsidies should focus on bolstering environmental incentives. Depending on farmers' income situations, the government should refine and enhance ecological compensation policies for rural environmental protection and management. By providing financial subsidies and tangible rewards, the government can reduce the transaction costs for farmers engaging in green production, ensuring they receive at least minimal compensation or benefits, thus fostering a stable economic outlook and driving enthusiasm for green production. Lastly, the potential of social networks should be maximized. There should be an active nurturing of group-based social networks among farmers and the formation of formalized and institutionalized social groups in rural

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areas to broaden communication channels and expand their networks, amplifying the positive impact of social networks in promoting green production technologies. These recommendations are particularly pertinent for economies characterized by a vast number of small-scale farmers, as observed in China and other developing countries.

7. Limitations and further research

Meanwhile, there are aspects of this study that warrant further improvement. We overlooked the role of economic value alignment, which restricts our understanding of its mediating effect between environmental policies, social networks, and farmers' sustainable practices. In addition, we didn't comprehensively analyze the inherent facets of the two social network types, limiting our grasp of their distinct impacts on sustainable farming behaviors. Moreover, our sample size falls short of ideal. We plan to address these shortcomings in our future research.

References

[1] Kansanga M, Andersen P, Kpienbaareh D, et al. Traditional agriculture in transition: Examining the impacts of agricultural modernization on smallholder farming in Ghana under the new Green Revolution[J]. International Journal of Sustainable Development & World Ecology, 2019, 26(1): 11-24.

[2] Hossain A, Krupnik T J, Timsina J, et al. Agricultural land degradation: processes and problems undermining future food security[M]//Environment, climate, plant and vegetation growth. Cham: Springer International Publishing, 2020: 17-61.

[3] Qiao D, Li N, Cao L, et al. How agricultural extension services improve farmers' organic fertilizer use in China? The perspective of neighborhood effect and ecological cognition[J]. Sustainability, 2022, 14(12): 7166.

[4] Kutter T, Louwagie G, Schuler J, et al. Policy measures for agricultural soil conservation in the European Union and its member states: policy review and classification[J]. Land Degradation & Development, 2011, 22(1): 18-31.

[5] Conley T G, Udry C R. Learning about a new technology: Pineapple in Ghana[J]. American economic review, 2010, 100(1): 35-69.

[6] Björkegren D, Karaca B C. Network adoption subsidies: A digital evaluation of a rural mobile phone program in Rwanda[J]. Journal of Development Economics, 2022, 154: 102762.

[7] Douglas Creed W E, Hudson B A, Okhuysen G A, et al. Swimming in a sea of shame: Incorporating emotion into explanations of institutional reproduction and change[J]. Academy of Management Review, 2014, 39(3): 275-301.

[8] McEvily B, Perrone V, Zaheer A. Trust as an organizing principle[J]. Organization science, 2003, 14(1): 91-103.

[9] Ajzen I. The theory of planned behavior[J]. Organizational Behavior and Human Decision Processes, 1991, 50(2): 179-211.

[10] Timprasert S, Datta A, Ranamukhaarachchi S L. Factors determining adoption of integrated pest management by vegetable growers in Nakhon Ratchasima Province, Thailand[J]. Crop protection, 2014, 62: 32-39.

[11] Wen Z, Chang L, Hau K T, et al. Testing and application of the mediating effects[J]. Acta psychologica sinica, 2004, 36(05): 614.