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CONFIGURATIONAL PATHWAYS TO FRUIT FARMERS' WILLINGNESS TO PARTICIPATE IN RURAL TOURISM DEVELOPMENT: AN FSQCA APPROACH

Ding Xiaodong[12], Wu Yi[2], Shen Shurong[2], Liu Nannan[1], Faiz Izwan Anuar[1*]

[1]Department of Tourism Management, Faculty of Hotel & Tourism Management, Universiti Teknologi MARA, Malaysia
2024746313@student.uitm.edu.my https://orcid.org/0009-0005-3320-061X
2022546745@student.uitm.edu.my https://orcid.org/0009-0002-2219-5032
faizwanuar@uitm.edu.my https://orcid.org/0000-0002-8105-8866
[2]School of Economics and Management, Liaoning Agricultural Vocational and Technical College, Liaoning, Yingkou, China
1725773320@qq.com https://orcid.org/0009-0007-4214-3383
2024746313@student.uitm.edu.my https://orcid.org/0009-0005-3320-061X
9885592@qq.com https://orcid.org/0009-0000-1337-0084
*Corresponding Author

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Abstract:

Against the background of rural revitalization, rural tourism based on distinctive agricultural resources has emerged as an important pathway for cultivating new rural industries and business models. As a form of specialty agriculture, fruit farming integrates production, ecological, landscape, and experiential functions. However, existing studies have largely focused on tourists or general farming households, with limited attention to the complex mechanisms shaping fruit farmers' willingness to participate in rural tourism development. Based on the SOR framework and 377 valid questionnaires, this study employs fuzzy-set qualitative comparative analysis (fsQCA) to examine how resource environment perception, policy environment perception, expected benefits, and perceived behavioural control jointly shape such willingness. The results indicate that no single condition constitutes a necessary condition for either high or non-high willingness. Three configurations leading to high willingness and four configurations leading to non-high willingness are identified, revealing clear causal asymmetry. The findings demonstrate that fruit farmers' willingness is jointly shaped by multiple conditions rather than any single factor. Accordingly, policy efforts should focus on strengthening resource foundations, improving policy support, enhancing expected benefits, and promoting capability development.

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Configurational Analysis, Fruit Farmers, fsQCA, SOR Theory, Willingness to Participate in Rural Tourism Development

Introduction

Rural tourism has gradually become a major avenue for fostering new rural industries and business forms as the Rural Revitalization Strategy continues to advance and as the leisure consumption demand of urban and rural residents keeps growing. By relying on distinctive local agricultural resources, rural ecological environments, and indigenous cultural conditions, many regions have developed rural tourism in ways that are adapted to local circumstances. As a critical type of specialty agriculture, fruit farming not only performs the function of supplying agricultural products, but also possesses multiple values related to ecological conservation, landscape display, and leisure experience. This gives it a high degree of compatibility with rural tourism in terms of resource utilization, industrial extension, and value addition. For regions with relatively abundant fruit industry resources, the organic integration of orchard picking, farming experience activities, leisure sightseeing, and agricultural product sales can not only expand the functional boundaries of traditional fruit production but also create new possibilities for fruit farmers to transform household operations and diversify their sources of income.

Existing studies have produced substantial insights into rural tourism, mainly focusing on social governance and policy functions, technological empowerment, ecological and environmental protection, and changes in market demand. In terms of social governance and policy functions, rural tourism is generally regarded as an important vehicle for promoting rural revitalization (Dai et al., 2023), facilitating urban‑rural integration (Sert, 2024), increasing farmers' income, and advancing common prosperity (He et al., 2022). It is also considered to play a positive role in optimizing resource allocation, improving rural governance, and promoting coordinated regional development (Song et al., 2025; Tan et al., 2025). Existing research on technology-enabled tourism is mostly from the perspective of tourists, incorporating AI technologies such as artificial intelligence, digital transformation, and smart tourism, in improving tourist experiences (Zhu & Shang, 2021), enhancing destination attractiveness, and increasing revisit intention (Sidiq et al., 2025; Wu et al., 2024). In the ecological and environmental dimension, scholars have mainly examined the relationship between ecological protection and economic benefits in the process of rural tourism

development (Chen, 2021; Fan & Li, 2024). Scholars argue that rural tourism should prioritize low-carbon, green, environmentally friendly, and sustainable development (Hu et al., 2021), and on this basis, achieve both ecological and economic benefits (Rahman et al., 2025). Regarding market demand, scholars are particularly interested in product innovation derived from rural tourism, including the continuous development of new forms such as vacation and leisure tourism, wellness experiences, rural study tours, and local cultural experiences (Madanaguli et al., 2021).

Overall, existing research has advanced the understanding of rural tourism, but further research is still warranted. For example, previous studies have primarily focused on tourists (Li et al., 2025), tourism business operators, or general farming households (Priatmoko et al., 2023; Zhao et al., 2025). However, public attention to fruit farmers is relatively limited. Fruit farmers function not only as agricultural producers and operators but also as key actors in rural tourism development. Furthermore, most existing studies only consider the influence of a single factor on behavioral intentions (Yu, 2022), with less attention paid to the relationships between multiple factors.

In fact, the willingness of fruit farmers to develop rural tourism may not be determined by a single factor, but rather by the combined effect of multiple factors (Dong et al., 2024). In terms of research methods, existing literature mainly uses logistic regression models or PLS-SEM models (Dang et al., 2026; Lin & Lai, 2025), which are primarily used to identify the net effect of variables.

Existing studies have paid relatively limited attention to fruit farmers as a distinct group, with most research focusing on tourists or general farming households. Methodologically, regression analysis and structural equation modelling are commonly employed, which typically emphasize identifying the independent net effects of variables on tourism participation intention. As a result, these approaches are less capable of fully capturing the interaction effects among multiple conditions and their configurational implications.

Under similar resource and policy environments, however, fruit farmers' willingness to participate in rural tourism development still exhibits marked variation. This indicates that its formation mechanism is inherently complex, characterized by the conjunctural effects of multiple conditions, the presence of equifinal pathways leading to the same outcome, and causal asymmetry between the presence and absence of the outcome. Such complexity cannot be adequately explained by the independent net effects of variables but is more likely to arise from the combined configuration of multiple conditions. Therefore, it is necessary to systematically identify the configurational pathways shaping fruit farmers' willingness to participate in rural tourism development from a configurational perspective.

Compared with conventional approaches, fsQCA goes beyond the assumptions of linearity and symmetry, and is capable of uncovering the interdependencies among multiple conditions, equifinal pathways, and causal asymmetry. It is therefore more suitable for analysing research problems characterized by causal complexity.

Specifically, the formation of fruit farmers' willingness to participate in rural tourism development involves multiple factors, including resource environment perception, policy environment perception, expected benefits, and perceived behavioural control. These factors do not operate in a simple additive manner; rather, different combinations of conditions may

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lead to the same outcome, while the pathways leading to high and non-high willingness are also causally asymmetric.

In this context, traditional regression and structural equation modelling primarily focus on estimating the independent net effects of variables, making it difficult to identify multiple pathways associated with different combinations of conditions. In contrast, fsQCA, from a configurational perspective, enables the identification of how multiple conditions jointly produce the same outcome. Therefore, compared with conventional methods, fsQCA is better suited to capturing configurational effects and identifying causal pathways, making it more aligned with the research question and analytical objectives.

Building on the above analysis, this study adopts the SOR framework, in which resource environment perception and policy environment perception are conceptualized as the stimulus (S), expected benefits and perceived behavioural control as the organism (O), and willingness to participate in rural tourism development as the response (R). Furthermore, fsQCA is employed to examine how multiple conditions jointly shape fruit farmers' willingness from a configurational perspective.

The Theoretical Contributions Are Threefold.

First, in the field of rural tourism research, this study focuses on fruit farmers as a micro-level subject and demonstrates that their willingness to participate in rural tourism development is jointly shaped by multiple conditions, including resource environment perception, policy environment perception, and individual cognition. By doing so, it advances the understanding of participation mechanisms in rural tourism and addresses the limitation of existing studies that predominantly focus on tourists or macro-level perspectives.

Second, in the field of farmer decision-making and behaviour, the analysis moves beyond the assumption of single rationality and reveals the asymmetric relationships among perceived behavioural control, expected benefits, and external environmental conditions, thereby enriching the explanation of complexity in farmers' participation decisions.

Third, in terms of methodological application, it introduces fsQCA into the analysis of fruit farmers' willingness to participate in rural tourism development. By identifying multiple configurational pathways, it uncovers features such as conjunctural causation, equifinality, and causal asymmetry, thereby extending the application of fsQCA in the interdisciplinary context of agriculture and rural tourism.

In addition, the findings provide policy implications for enhancing fruit farmers' willingness to participate, while offering practical guidance for governments to optimize policy support and promote effective engagement in rural tourism development.

Theoretical Foundation and Model Development

Theoretical Foundation

The SOR theory was first proposed by Mehrabian and Russell in 1974 as a psychological framework to explain how an individual's internal state influences their response to the external

environment. This framework consists of three parts: stimulus, organism, and response, and has been widely used in research on individual behavior (Çıkı, 2025).

In this study, S (Stimulus) refers to external environmental stimuli, primarily reflected in fruit farmers' subjective perceptions of surrounding development conditions, including the resource environment and the policy environment. The resource environment captures farmers' perceptions of local natural ecology, orchard landscapes, distinctive fruit resources, and the conditions for developing local cultural resources. In contrast, the policy environment reflects farmers' evaluations of external support conditions, such as government support, institutional safeguards, organizational assistance, and training guidance.

O (Organism) refers to the internal psychological states and cognitive evaluations formed under external stimuli, primarily represented by expected benefits and perceived behavioural control. Expected benefits capture farmers' judgments about potential gains from participating in rural tourism development, including income growth, expanded sales channels, product value enhancement, and improved development opportunities. Perceived behavioural control reflects farmers' perceptions of whether they possess the knowledge, capabilities, resource conditions, and confidence required to participate in such development and cope with related challenges.

R (Response) refers to the behavioural outcome, reflected in fruit farmers' willingness to participate in rural tourism development. Specifically, fruit farmers do not respond immediately to external environmental conditions. They first sense the environment, then assess their own abilities and experience to determine if they can participate and anticipate future benefits before forming a behavioral inclination to participate in rural tourism development. Overall, external environmental stimuli provide the contextual basis for behavioral choices, while internal cognitive assessment plays a crucial role in shaping these choices. These factors work together to ultimately influence fruit farmers' willingness to participate in rural tourism development.

It should be noted that, although this study adopts the SOR framework as an overall analytical structure, it does not follow the conventional linear path approach to test a single causal relationship between stimulus, organism, and response, nor does it emphasize the effect of any individual variable through fixed mediation pathways.

Instead, the analysis extends the SOR framework to a configurational analytical context, focusing on how multiple conditions − namely resource environment perception, policy environment perception, expected benefits, and perceived behavioural control−interact and combine under different conditions. In doing so, it seeks to uncover how external stimuli, and internal cognitive factors jointly shape fruit farmers' willingness to participate in rural tourism development through multiple pathways.

In other words, the formation of high willingness does not depend on any single factor but rather emerges from different combinations of multiple conditions. This approach thus represents an extension and contextualization of the SOR framework in the context of complex behavioural decision-making.

Accordingly, the SOR framework is adopted as the basis for variable classification and logical analysis and is combined with fuzzy-set qualitative comparative analysis (fsQCA) to examine, from a configurational perspective, how external stimuli and internal cognitive factors jointly shape fruit farmers' willingness to participate in rural tourism development. By identifying

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different combinations of conditions associated with high and non-high willingness, the analysis further reveals the characteristics of conjunctural causation, equifinality, and causal asymmetry.

Model Development

Fruit farmers' willingness to participate in rural tourism development is closely related to both external contextual cues and internal cognitive evaluations.

A review of the literature indicates that resource conditions and policy support are critical external contextual factors influencing rural tourism development, whereas expected benefits and perceived behavioural control function as core internal cognitive variables linking the external environment to behavioural intention. On this basis and drawing on both the literature review and real-world context, resource environment perception and policy environment perception are classified as Stimulus (S), perceived behavioural control and expected benefits as Organism (O), and high and non-high willingness as Response (R).

Furthermore, grounded in the SOR theory and combined with the fsQCA method, this study focuses on the interdependence, interaction, and configurational matching among resource environment perception, policy environment perception, perceived behavioural control, and expected benefits. It examines their differentiated configurational pathways leading to high willingness and non-high willingness to participate in rural tourism development and accordingly constructs the analytical framework of fruit farmers' willingness to participate in rural tourism development, as shown in Figure 1.

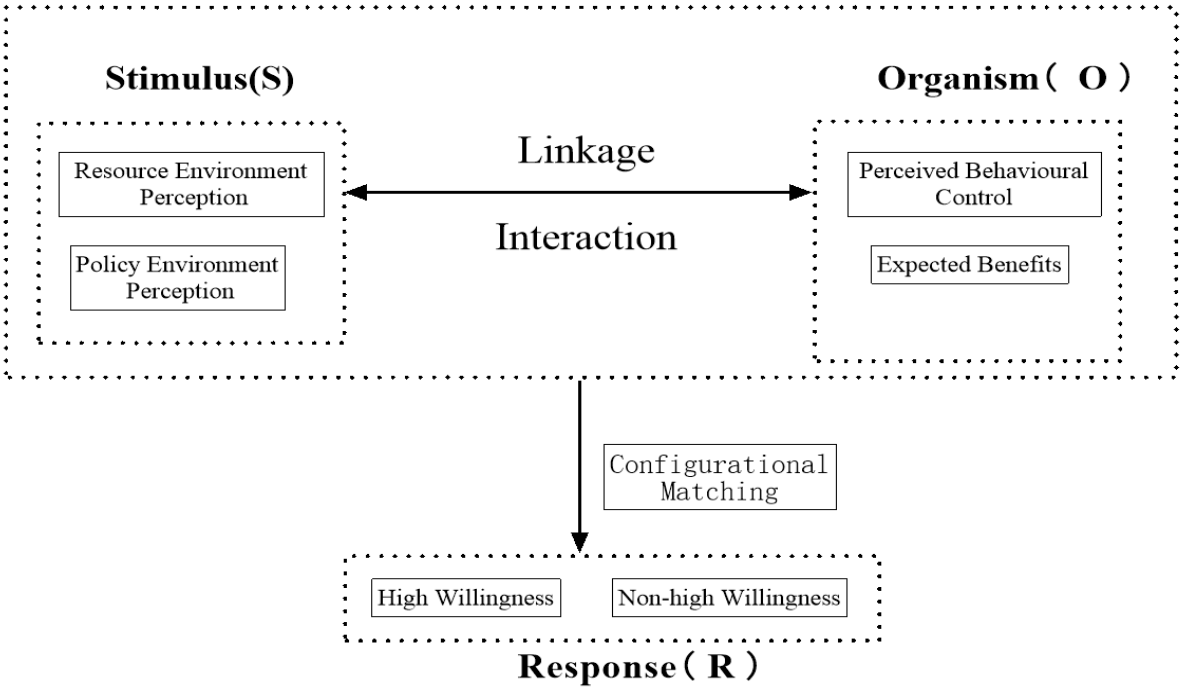

Figure 1: Configurational Analytical Framework Based on the SOR Model for Fruit Farmers' Willingness to Participate in Rural Tourism Development

Source: Developed by the Authors

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Research Methodology

Data Collection

The data used in this study were collected through field research conducted in October 2025 in Dalian, Dandong, Anshan, and Yingkou, Liaoning Province. To improve sample representativeness, all survey sites were selected from the list of China's National Key Rural Tourism Villages. In each prefecture-level city, two counties, towns, or villages with a certain foundation in the integrated development of agriculture and rural tourism were chosen as survey sites, and household questionnaire surveys were administered to local fruit farmers. The survey was carried out using a combination of stratified sampling and random sampling. A total of 400 questionnaires were distributed. After collection, review, and screening, 23 invalid questionnaires were excluded, resulting in 377 valid samples, with an effective response rate of 94.25%.

The basic characteristics of the sample are presented in Table 1. Overall, the surveyed fruit farmers were mainly middle-aged and older respondents, with a slightly higher proportion of men than women. Their educational attainment was concentrated primarily at the junior high school and senior high school levels. In terms of household characteristics, most households had three to four permanent residents, and most had three to four labourers. Regarding operation and income, the majority of respondents had been engaged in orchard management for less than five years, and annual household income was mainly concentrated in the range of 50 thousand yuan to 100 thousand yuan. More than half of the respondents reported that fruit-related income accounted for less than 40% of total household income. In addition, 45.7% of the respondents had received relevant training, while 39.7% had relevant development experience. The detailed distribution is shown in Table 1.

Table 1: Sample Distribution

Variable	Category	Frequency	Percentage (%)
Gender	Male	205	54.3
	Female	172	45.7
Age	18-35 years	36	9.5
	35-45 years	162	43.1
	45-60 years	140	37.1
	Above 60 years	39	10.3
Education Level	Primary school and below	20	5.2
	Junior high school	162	43.1
	Senior high school / Technical secondary school	110	29.3
	Junior college / Bachelor's degree and above	84	22.4
Number of Permanent Household Residents	1-2 persons	55	14.7
	3-4 persons	263	69.8
	5-7 persons	55	14.5
	More than 7 persons	4	1
	1-2 persons	42	11.2

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Number of Household Labourers	3-4 persons	205	54.3
	5-7 persons	104	27.6
	More than 7 persons	26	6.9
Membership in a Cooperative	Yes	124	32.76
	No	253	67.24
Received Relevant Training	Yes	172	45.7
	No	205	54.3
Years of Orchard Operation	Less than 5 years	166	43.97
	5-10 years	39	10.34
	10-15 years	29	7.76
	15-20 years	46	12.07
	More than 20 years	97	25.86
Orchard Area	Less than 5ha	185	49.14
	5-10 ha	65	17.24
	10-15 ha	46	12.07
	15-20 ha	23	6.03
	More than 20 ha	59	15.52
Annual Household Income	Less than 30 thousand yuan	72	19
	30-50 thousand yuan	52	13.8
	50-100 thousand yuan	140	37.1
	100-200 thousand yuan	75	19.8
	More than 200 thousand yuan	39	10.3
Share of Orchard Income	Less than 20%	153	40.5
	20%-40%	42	11.2
	40%-60%	52	13.8
	60%-80%	58	15.5
	More than 80%	72	19
Relevant Development Experience	Yes	150	39.7
	No	227	60.3

Source: Authors' Survey Data (2025)

Measurement of Variables

The questionnaire contained 37 items, 12 of which concerned basic characteristics of tourists. The remaining 25 items were measured using a five-point Likert scale, with scores ranging from 1 to 5, representing "strongly disagree", "disagree", "neutral", "agree" and "strongly agree" respectively. The specific measurement items for each variable are shown in Table 2.

Table 2: Reliability and Validity of the Measurement Scale

Measurement Items	Factor Loading	Cronbach's α	CR	AVE
REP1: I believe that the local natural environment is suitable for developing rural tourism.	0.771	0.908	0.932	0.734
REP2: I believe that local orchard landscapes have certain sightseeing and experiential value.	0.889			
REP3: I believe that local specialty fruit resources	0.893			

are attractive to tourists.				
REP4: I believe that local rural culture, folk customs, or lifestyles have potential for tourism development.	0.807			
REP5: I believe that the overall local resource conditions can support the development of rural tourism.	0.915			
PEP1: I believe that the local government attaches great importance to rural tourism development.	0.825			
PEP2: I believe that this area has certain supportive policies for rural tourism.	0.849			
PEP3: I believe that village collectives, cooperatives, or related organizations can provide assistance for rural tourism development.	0.828	0.888	0.916	0.686
PEP4: I believe that this area can provide training, guidance, or publicity support related to rural tourism.	0.873			
PEP5: I believe that fruit farmers can obtain certain external support when participating in rural tourism development.	0.763			
EB1: I believe that participating in rural tourism development can increase household income.	0.923			
EB2: I believe that participating in rural tourism development can expand sales channels for fruit products.	0.916			
EB3: I believe that participating in rural tourism development can increase the added value of agricultural products.	0.927	0.950	0.962	0.834
EB4: I believe that participating in rural tourism development can improve household living conditions.	0.927			
EB5: I believe that participating in rural tourism development can bring more development opportunities.	0.871			
PBC1: I believe that I have the basic ability to participate in rural tourism development.	0.852			
PBC2: I believe that I am able to learn the knowledge and skills related to rural tourism operation.	0.851			
PBC3: I believe that I have the conditions to devote time and energy to participating in rural tourism development.	0.892	0.928	0.946	0.776
PBC4: I believe that I am able to coordinate household resources to participate in rural tourism development.	0.914			
PBC5: Even if I encounter difficulties, I still have the confidence to participate in rural tourism development.	0.894			
WP1: I am willing to participate in local rural	0.927	0.957	0.967	0.854

tourism development activities.	
WP2: I am willing to integrate orchard operation with tourism experiences.	0.923
WP3: If conditions permit, I am willing to try developing tourism activities such as fruit picking and sightseeing.	0.917
WP4: I am willing to invest a certain amount of time and resources in rural tourism development in the future.	0.946
WP5: I am willing to support and actively participate in local rural tourism development.	0.907

Note: REP = Resource Environment Perception; PEP = Policy Environment Perception; EB = Expected Benefits; PBC = Perceived Behavioural Control; WP = Willingness to Participate in Rural Tourism Development.
Source: Analyzed by SPSS24.0

Reliability and Validity Analysis

Harman's single-factor test was employed to assess common method bias. The results indicate that, under the unrotated solution, the variance explained by the first principal component was 43.55%, below the critical threshold of 50%, suggesting that serious common method bias is not a concern.

Questionnaire reliability was evaluated using factor loadings, Cronbach's alpha, and composite reliability, while validity was assessed based on the average variance extracted (AVE), reflecting convergent validity. The detailed results are presented in Table 2. As shown, all Cronbach's alpha and composite reliability values exceed 0.8, and all AVE values are above 0.5.

These findings confirm that the measurement scale demonstrates satisfactory reliability and convergent validity. As shown in Table 3, the diagonal elements represent the square roots of the AVE values for the corresponding variables, which are 0.857, 0.828, 0.913, 0.881 and 0.924, respectively. The values below the diagonal are the correlation coefficients between each variable and the other variables. All results meet the required criteria, indicating that the measurement model has good discriminant validity.

Table 3: Correlation Matrix of the Variables

Variable	1	2	3	4	5	Mean	SD
1. REP	0.857					4.526	0.718
2. PEP	0.565***	0.828				4.209	0.890
3. EB	0.693***	0.545***	0.913			4.574	0.639
4. PBC	0.742***	0.504***	0.783***	0.881		4.360	0.832
5. WP	0.752***	0.511***	0.854***	0.866	0.924	4.519	0.678

Note: ***indicates significance at the 0.1% level. The diagonal values in the matrix are the square roots of the AVE values.
Source: Analyzed by SPSS24.0

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Variable Calibration

For fsQCA analysis, which is based on set theory, the key concern is the degree of membership of each case in a specific outcome set. Accordingly, before conducting the formal analysis, the raw variables need to be calibrated into fuzzy-set membership scores. In this study, resource environment perception, policy environment perception, expected benefits, and perceived behavioural control were treated as antecedent conditions and calibrated prior to analysis. Following the calibration procedure suggested by Ragin (2008), the 95th percentile, 50th percentile, and 5th percentile were set as the thresholds for full membership, the crossover point, and full non-membership, respectively, so as to transform the original data into fuzzy-set scores ranging from 0 to 1. The calibration was performed using the Calibrate function in the fsQCA software.

Research Methodology

Necessary Condition Analysis

This analysis first examined the necessity of each individual condition and its negation set, the results of which are shown in Table 4. In fsQCA, a condition is considered a necessary condition for an outcome if it is always present when the outcome occurs (Dul, 2016). As shown in Table 4, the consistency values of all individual antecedent conditions, regardless of the level of willingness to participate in rural tourism development, are all below the threshold of 0.9. Therefore, no single condition constitutes a necessary condition for the outcome, indicating that the explanatory power of any single factor on the willingness to participate in rural tourism development is limited.

Table 4. Necessary Condition Analysis

Condition	High Willingness		Non-high Willingness	
	Consistency	Coverage	Consistency	Coverage
REP	0.8138	0.8140	0.7394	0.7393
～REP	0.3477	0.4869	0.5455	0.4010
PEP	0.7566	0.7790	0.6993	0.6723
～PEP	0.4181	0.5631	0.5526	0.3896
EB	0.8190	0.8087	0.7287	0.7419
～EB	0.3818	0.5445	0.8094	0.7931
PBC	0.3601	0.4942	0.4839	0.3506
～PBC	0.8493	0.8619	0.7394	0.7393

Note: "～" indicates the negation of the condition in Boolean logic.
Source: Analyzed by fsQCA3.0

Construction of the Truth Table

First, this study used resource environment perception, policy environment perception, expected benefitsSource: Analyzed by fsQCA3.0

, and perceived behavioural control as antecedent conditions, and rural tourism development intention as the outcome variable, to construct the truth table with the aid of fsQCA 3.0 software. Because four antecedent conditions were included, 16 possible combinations of

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conditions could theoretically be generated. Following the general guidelines of QCA (Ragin, 2008), and taking into account the sample size and research needs, the frequency threshold was set at 1, the raw consistency threshold was set at 0.8, and the PRI consistency threshold was also set at 0.8. On this basis, a sufficiency analysis of the configurations of antecedent conditions was further conducted.

Configurational Analysis

Building on the necessary condition analysis, it further employed fsQCA to examine the configurations of antecedent conditions associated with fruit farmers' willingness to participate in rural tourism development. Using resource environment perception, policy environment perception, expected benefits, and perceived behavioural control as antecedent conditions, and high willingness and non-high willingness as the outcome variables, three configurational pathways leading to high willingness and four configurational pathways leading to non-high willingness were ultimately identified. The detailed results are presented in Table 5.

The results indicate that three configurational pathways lead to high willingness, with a solution consistency of 0.840 and a solution coverage of 0.838. In contrast, four configurational pathways lead to non-high willingness, with a solution consistency of 0.813 and a solution coverage of 0.841. The specific analysis results are as follows:

Configurational Analysis of High Willingness

As shown in Table 5, three configurational pathways, namely SEI1, SEI2, and SEI3 are identified as leading to high willingness.

In the SEI1 pathway, both resource environment perception and policy environment perception appear as core conditions, reflecting a synergistic driving mechanism of resource and policy factors. The presence of these core conditions indicates that, under this configuration, external environmental factors play a dominant role in shaping fruit farmers' willingness. Specifically, the resource environment provides a material foundation and feasibility perception for rural tourism development, while the policy environment enhances farmers' confidence through institutional support, organizational assistance, and technical training.

Importantly, these factors do not operate in a simple additive manner; rather, their synergistic interaction jointly reduces development uncertainty, thereby promoting a higher level of willingness. From the perspective of the SOR framework, this pathway highlights the dominant role of external stimuli under specific configurations. When external environmental conditions are sufficiently supportive, individuals may still exhibit strong behavioural responses even if internal capabilities or other conditions are not fully developed.

In the SEI2 pathway, resource environment perception and expected benefits appear as core conditions, reflecting a synergistic driving mechanism between resource factors and economic returns. The presence of these core conditions indicates that, under this configuration, resource endowment and expected benefits jointly constitute the key drivers of fruit farmers' willingness to participate in rural tourism development.

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Specifically, the resource environment provides a material foundation and perceived development potential for rural tourism, while expected benefits strengthen farmers' motivation from an economic perspective. These factors do not operate in a simple additive manner; rather, they interact through a linkage between resource developability and benefit realizability. On the one hand, favourable resource endowment increases the likelihood of realizing economic returns; on the other hand, clear expectations of benefits further reinforce the perceived value of resources and the willingness to engage in development.

Therefore, when both resource conditions and expected benefits are high, fruit farmers are more likely to form a positive development intention. From the perspective of the SOR framework, this pathway reflects a mechanism in which external stimuli and internal cognitive evaluations jointly shape behavioural responses, indicating that willingness emerges from the combined influence of external conditions and economic motivation.

In the SEI3 pathway, resource environment perception and policy environment perception appear as core present conditions, while perceived behavioural control emerges as a core absent condition, reflecting a compensatory mechanism of external environmental factors. This configuration indicates that, in certain situations, fruit farmers may still exhibit a high level of willingness even when they lack confidence in their own capabilities and resource conditions. Specifically, the resource environment provides the objective foundation for rural tourism development, while the policy environment reduces development barriers through institutional support, organizational assistance, and training services. The joint effect of these factors can partially substitute for or compensate the constraints arising from insufficient individual capability perception, thereby lowering perceived risks and enhancing farmers' willingness to participate.

Accordingly, this pathway demonstrates that external environmental conditions can play a substitutive role under specific configurations, weakening the negative influence of limited individual capabilities through institutional and resource support. From the perspective of the SOR framework, this pathway highlights both the dominant and compensatory roles of external stimuli, indicating that behavioural responses are not entirely dependent on internal cognition, but may be directly driven by favourable external conditions.

This further implies that, under sufficiently strong institutional and resource support, individual capability is not a necessary prerequisite for the formation of willingness.

Configurational Analysis of Non-high Willingness

Four configurational pathways, namely NSEI1, NSEI2, NSEI3, and NSEI4, are identified as leading to non-high willingness.

In the NSEI1 pathway, resource environment perception and expected benefits appear as core absent conditions, while policy environment perception is present as a peripheral condition, reflecting a constraint mechanism driven by the joint absence of resource and benefit factors. The absence of these core conditions indicates that, under this configuration, insufficient resource endowment and weak benefit expectations constitute the primary constraints on fruit farmers' willingness to participate in rural tourism development.

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Although farmers may perceive a certain degree of policy support, the lack of developable resource foundations and confidence in benefit realization prevents such support from being translated into actual participation motivation. In other words, external institutional support alone is insufficient to offset the combined constraints arising from the absence of both resource and benefit conditions.

From the perspective of the SOR framework, this pathway reflects an inhibitory mechanism under the joint weakening of external stimuli and internal cognition, indicating that when both key environmental and cognitive factors are lacking, behavioural responses are unlikely to be activated.

In the NSEI2 pathway, expected benefits appear as a core absent condition, while perceived behavioural control emerges as a core present condition, reflecting a constraint mechanism driven by insufficient benefit expectations. This configuration indicates that, even when fruit farmers possess a certain level of capability perception and resource coordination ability, the absence of positive expectations regarding the returns from rural tourism development hinders the formation of participation motivation.

The contrast between core conditions demonstrates that capability perception alone cannot be directly translated into behavioural intention; rather, only when expected benefits are sufficiently assured can capability advantages be converted into actual participation. Therefore, expected benefits play a critical motivational role in this pathway and exhibit a clear threshold effect.

From the perspective of the SOR framework, this pathway reflects an asymmetry among internal cognitive factors, indicating that the formation of behavioural responses relies more heavily on benefit evaluation than on capability perception alone.

In the NSEI3 pathway, policy environment perception appears as a core absent condition, while perceived behavioural control emerges as a core present condition, reflecting a constraint mechanism driven by insufficient institutional support. The relatively high unique coverage of this pathway highlights its strong independent explanatory power.

This configuration demonstrates that, even when fruit farmers have strong confidence in their own capabilities and possess a certain level of resource integration ability, the absence of positive perceptions of policy support, organizational guidance, and institutional safeguards makes it difficult for willingness to develop. This finding implies that having capability does not necessarily lead to willingness, and that the external institutional environment plays a critical supporting role in behavioural decision-making.

From the perspective of the SOR framework, this pathway reflects the inhibitory effect of insufficient external stimuli on behavioural responses, indicating that when key institutional stimuli are lacking, internal cognitive factors alone are insufficient to drive the formation of willingness.

In the NSEI4 pathway, resource environment perception appears as a core absent condition, while perceived behavioural control is present as a peripheral condition, reflecting a constraint mechanism driven by insufficient resource foundations. The absence of this core condition indicates that when fruit farmers do not perceive local resources as having development

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potential, it is difficult for them to form a high level of willingness, even if they possess certain capability conditions.

In this pathway, the resource environment plays a fundamental and prerequisite role. Its absence directly weakens the perceived feasibility of development, thereby inhibiting the emergence of behavioural responses. From the perspective of the SOR framework, this pathway reflects an inhibitory effect caused by the absence of key external stimuli, indicating that insufficient resource conditions directly constrain the formation of willingness.

Taken together, the results indicate that resource environment perception repeatedly appears as a core condition across multiple configurations, suggesting that it plays a fundamental and dominant role in shaping fruit farmers' willingness to participate in rural tourism development.

Table 5. Configurations of High and Non-high Willingness to Participate in Rural Tourism Development

Variable Combinations	High Willingness			Non-high Willingness			
	HWP1	HWP 2	HWP 3	NHWP 1	NHWP 2	NHWP 3	NHWP 4
REP	●	●	●	⊗			⊗
PEP	●		●	•		⊗	
EB		●		⊗	⊗		
PBC			⊗		●	●	•
Consistency	0.842	0.883	0.897	0.890	0.906	0.875	0.917
Raw Coverage	0.66	0.686	0.232	0.595	0.644	0.671	0.660
Unique Coverage	0.078	0.083	0.07	0.055	0.042	0.223	0.031
Solution Consistency		0.840			0.813		
Solution Coverage		0.838			0.841		

Note:● and • indicate the presence of a condition, ⊗ and ⊗ indicate the absence of a condition. Blank cells indicate that the condition may be either present or absent in the configuration. ● and ⊗ denote core conditions, • and ⊗ denote peripheral conditions.
Source: Analyzed by fsQCA3.0

Robustness Test

To examine the robustness of the findings, the configurations of antecedent conditions were re-tested by adjusting the parameters of the truth table analysis. Specifically, the frequency threshold was increased from 1 to 2, and the consistency threshold was raised from 0.80 to 0.85, after which the configurational analysis was conducted again.

The results indicate that, following parameter adjustment, the main configurational pathways for both high and non-high willingness remained broadly consistent with the original results, with no substantive changes observed in the combinations of core conditions. In addition, fluctuations in solution consistency and coverage were minimal.

Resource environment perception remained a dominant core condition for high willingness, while the absence of expected benefits and policy environment perception continued to act as

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primary constraints leading to non-high willingness. These findings confirm the stability and reliability of the configurational results.

Conclusions and Policy Implications

Conclusions

By synthesizing the configurational results for high willingness and non-high willingness, the results demonstrate that the formation of fruit farmers' willingness to participate in rural tourism development exhibits clear complexity and asymmetry.

First, there are multiple pathways leading to high willingness. High willingness can be driven either by the combination of resource environment perception and policy environment perception or by the combination of resource environment perception and expected benefits, indicating that fruit farmers' willingness to participate in rural tourism development displays a typical characteristic of equifinality.

Second, resource environment perception plays a fundamental role in the configurations. In the pathways leading to high willingness, resource environment perception consistently appears as a core present condition. By contrast, in the pathways leading to non-high willingness, it repeatedly appears as a core absent condition. This suggests that the resource base is a key prerequisite in fruit farmers' judgments about whether to participate in rural tourism development.

Third, policy environment perception and expected benefits are key differentiating conditions influencing development willingness. When fruit farmers perceive strong policy support or form positive expectations regarding potential benefits, their willingness to participate is more likely to be stimulated. Conversely, even if they possess certain capabilities and conditions, they may still exhibit non-high willingness when policy support is lacking or when tangible benefits are not expected.

Fourth, high willingness and non-high willingness are not simply opposite states. In the pathways leading to non-high willingness, perceived behavioural control repeatedly appears as a present condition. This indicates that capability perception alone cannot determine development willingness; rather, it must be matched with conditions such as resources, policy support, and expected benefits in order to be translated into a genuinely positive tendency to participate in rural tourism development. This further confirms the characteristic of causal asymmetry in the formation of fruit farmers' willingness to participate in rural tourism development.

Policy Implications

Based on the above findings, it can be observed that efforts to enhance fruit farmers' willingness to participate in rural tourism development should focus on the following aspects.

First, it is necessary to strengthen the resource environment foundation and enhance fruit farmers' perceptions of local tourism development resources. The results indicate that resource environment perception consistently appears as a core present condition in the configurations leading to high willingness, while repeatedly emerging as a core absent condition in the

configurations leading to non-high willingness. This indicates that the resource base is a key prerequisite influencing fruit farmers' willingness to participate in rural tourism development. Therefore, greater efforts should be made to consolidate the resource environment foundation for rural tourism development and to improve fruit farmers' direct perceptions of the developability and sustainability of local resources. Specifically, it is important to strengthen infrastructure construction in rural areas, including roads, parking areas, tourism signage, communication networks, and environmental sanitation facilities, so as to improve the reception capacity of rural tourism destinations. At the same time, based on regional fruit-industry characteristics, natural landscapes, and local cultural resources, integrated development should be promoted across activities such as orchard picking, farming experiences, folk-custom displays, and leisure sightseeing, thereby enhancing the accessibility, experiential value, and marketability of local resources. In addition, attention should be paid to the overall appearance of villages and ecological environment improvement so as to enhance the overall attractiveness of rural tourism destinations. Only when fruit farmers genuinely perceive that their locality has resources, development potential, and long-term sustainability can their willingness to participate in rural tourism development be fundamentally strengthened.

Second, policy support should be supplied in a more targeted manner in order to enhance fruit farmers' positive perceptions of the external support environment. The findings indicate that policy environment perception is one of the important conditions for the formation of high willingness, whereas insufficient policy support is likely to lead to non-high willingness. This suggests that the external institutional environment not only affects fruit farmers' confidence in rural tourism development, but also significantly shapes their actual willingness to participate. Therefore, more targeted policy provision is needed to transform policy advantages into tangible, accessible, and reliable support that fruit farmers can clearly perceive. More specifically, a more comprehensive support system should be established around key aspects of rural tourism development, including project planning, operational guidance, market linkage, financial services, and risk prevention. Policy publicity and information dissemination should also be strengthened to avoid situations in which policies exist but are not adequately perceived by fruit farmers. In addition, through demonstration projects, the promotion of exemplary cases, and field visits, fruit farmers can be enabled to more directly observe the practical role of policy support in facilitating rural tourism development. Only by continuously improving the visibility and credibility of policy support can fruit farmers' wait-and-see attitudes be effectively reduced and their willingness to participate be enhanced.

Third, it is important to emphasize a benefit-oriented approach and strengthen fruit farmers' positive expectations regarding rural tourism development. The results indicate that expected benefits are not only an important driver of high willingness, but also an important constraining factor behind non-high willingness. This means that fruit farmers' willingness to participate in rural tourism development depends to a large extent on whether they can foresee tangible economic returns. Accordingly, a stronger benefit-oriented approach should be adopted by expanding income-generating channels and improving benefit-sharing mechanisms so as to reinforce fruit farmers' positive expectations. In practical terms, efforts should be made to accelerate the deep integration of rural tourism and specialty fruit industries by developing diversified business forms such as fruit-picking experiences, agricultural product exhibitions and sales, brand building, leisure catering, and study-tour programmes, thereby increasing the added value of the fruit industry. Regional brand building and market promotion should also be strengthened in order to improve the market recognition and consumer appeal of specialty

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fruits and rural tourism products. At the same time, more reasonable benefit-linkage mechanisms should be established to enable fruit farmers to share the gains of rural tourism development through land, labour, products, and services, thus avoiding situations in which tourism develops while local households benefit only marginally. Only when fruit farmers truly see that participation can generate stable and predictable economic returns can their willingness to engage in rural tourism development be fundamentally stimulated.

Fourth, greater attention should be paid to capability cultivation and condition matching so as to facilitate the transformation from "having the ability" to "having the willingness". The results further indicate that perceived behavioural control alone cannot independently generate high willingness. In some pathways leading to non-high willingness, fruit farmers possessed a certain degree of capability perception yet still failed to develop high willingness because of insufficient resource support, policy guarantees, or expected benefits. This indicates that although capability enhancement is important, it must be effectively matched with resources, policies, and benefit expectations in order to be translated into a positive willingness to participate. Therefore, while strengthening capacity-building efforts, equal attention should be given to improving the alignment between capability development and actual development conditions. Specifically, fruit farmers can be provided with differentiated and targeted training in areas such as rural tourism operation and management, reception services, agricultural product marketing, e-commerce live-streaming, short-video promotion, and safety management, so as to improve their practical skills. Through the cultivation of demonstration households, the promotion of representative cases, and on-site observation activities, fruit farmers' intuitive understanding of rural tourism development can be enhanced, helping them form more positive judgments. In addition, continuous business guidance and supporting services should be provided during the initial stage of project development in order to reduce concerns arising from insufficient ability or lack of experience. Only by integrating capability cultivation with resource development, policy support, and benefit realization can fruit farmers' willingness to participate be more effectively transformed into actual action.

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Author Contribution Statement: Ding Xiaodong was responsible for manuscript writing and overall development.Wu Yi and Shen Shurong were responsible for data collection and organization.Liu Nannan was responsible for model construction and data analysis.Faiz Izwan Anuar contributed to conceptualization, methodological guidance, supervision, and manuscript revision.

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