Original Research

Influencing Factors of Environmental Behaviors of Leisure Agriculture Operators - Based on Integrating Theory of Planned Behavior and Norm Activation Model

Xiaojie Wang[1], Wentao Zhou[2], Faming Zhou[3]*

[1]Business College, Hunan University of Humanity, Science and Technology, Loudi 417000, China
[2]Energy and Mechanical Electrical Engineering college, Hunan University of Humanity, Science and Technology, Loudi 417000, China
[3]Business College, Hunan First Normal University, Changsha 410128, China

Abstract

Exploring the factors influencing the environmental behavior willingness of leisure agriculture operators is conducive to promoting the development of green transformation of agriculture and achieving the goal of carbon peaking and carbon neutrality. This essay takes the integrated model of planned behavior theory (TPB) and normative activation theory (NAM) as the theoretical framework, and uses 347 survey data in Huzhou City, Zhejiang Province to explore the factors affecting the environmental behavior intention of leisure agriculture operators through structural equation model (SEM). The results show that: (1) The attitude of leisure agriculture business subjects has the greatest effect on the willingness to behave environmentally, and the influence of responsibility attribution and personal norms on the willingness of leisure agriculture business subjects to behave environmentally is relatively small. (2) The behavior attitude, perceptual behavior control and personal norms of leisure agriculture business subjects are the direct factors that determine their environmental behavior willingness, and the subjective norms indirectly influence the environmental behavior willingness of leisure agriculture business subjects through individual norms and responsibility attribution. Based on the above conclusions and combined with the actual situation of the research, the following countermeasures are proposed: pay attention to publicity and education, enhance environmental awareness and cultivate positive attitudes; increase government support and promote

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*e-mail: zfm7803@sina.com

environmental protection innovation; strengthen the awareness of results and stimulate the moral responsibility of leisure agriculture operators to protect the environment.

Keywords: leisure agriculture, environmental behavior, theory of planned behavior, norm activation model, influencing factor

Introduction

Leisure agriculture first originated in Italy in the 1830s. Different scholars have different opinions on the connotation of the concept of leisure agriculture. The terms related to leisure agriculture include Agri-tourism, Farm tourism Rural Tourism, Farm Tourism, Village Tourism, Alternative Tourism, Green Tourism, and so on. Due to the tension of urban life and the long-term separation of urban residents from nature and agriculture, there is a great demand for leisure [1, 2]. For a long time, urban residents have been under pressure from work, life, ecological environment, and to release these pressures and obtain balanced physical and mental development, they need to visit the countryside for sightseeing and leisure activities [3]. Leisure agriculture as a kind of agriculture and tourism leisure, sightseeing activities and other services organic integration and biochemical out of the new industry. it adheres to the concept of sustainable development, relying on agricultural production, folk culture, natural environment and other resources. The development of leisure agriculture can not only alleviate the current agricultural development process of agricultural economic structure, poor ecological environment, low economic benefits and other real problems, but also achieve the harmonious unity of the three major benefits of economy, society and ecology.

Since the beginning of the new century, China's leisure agriculture has shown a "blowout" development trend. In 2018, the scale of China's leisure agriculture market will be close to 590 billion yuan. In 2022, the operating revenue of leisure agriculture will reach a new high of 700 billion yuan. By the end of 2020, China had set up 388 demonstration counties for leisure agriculture and rural tourism, and there were 1216 "China Beautiful Leisure Villages" and 1199 "China Rural Tourism Key Villages". China's leisure agriculture has initially formed a pattern of joint development of family operation, cooperative operation, collective operation, and enterprise operation. The development of leisure agriculture is not only conducive to the full exploitation of rural resources but also allows more marketing opportunities for agricultural products and promotes the economic development of rural areas [4]. By the end of 2020, the total number of leisure agriculture business entities in China has reached 150,000, with the highest percentage of leisure agriculture business entities mainly in rural tourism and special agricultural tourism, including about 60,000 farmhouses, 35,000 leisure farms, and 20,000 agricultural tourism parks. According to statistics, the development of leisure agriculture business entities, directly creates jobs for about 4 million, and the annual income for farmers can reach tens of billions.

Promoting sustainable development requires a good agroecological environment as support. With the continuous development of leisure agriculture, the environmental problems in leisure agriculture are becoming more and more prominent. According to the Food and Agriculture Organization of the United Nations (FAO), the global pesticide use in 2020 is 267 million tons, and the total global fertilizer consumption in 2020 is 53 million tons. The ecological damage and the solution to environmental pollution problems are still the great challenges faced in the development of leisure agriculture. In the context of sustainable development, taking the road of green and low-carbon development is the only choice to promote the development of leisure agriculture. As the reliance and carrier of leisure agriculture industry development planning, construction, and operation, the strength of its environmental behavior is directly linked to the economic benefits, ecological environment, and the development of recycling-based leisure agriculture, which has a direct impact on the future of leisure agriculture [5]. How to maintain and protect the ecological environment of leisure agriculture and how to promote the implementation of environmental behaviors by leisure agriculture operators has become an important research topic nowadays.

In response to the above background, the main objectives of this study are as follows: (1) To reveal the mechanism of the occurrence of environmental behaviors of leisure agriculture operators. (2) To clarify the main factors affecting the environmental behavior of leisure agriculture operators. (3) Enrich the theoretical results of leisure agriculture research and environmental behavior research, and provide a theoretical basis for the implementation of environmental behavior in leisure agriculture business organizations. The main contributions of this study are as follows: firstly, based on the TPB-NAM analytical framework, structural equation modeling is used to investigate the factors influencing the environmental behavior of leisure agriculture operators, which enhances the theoretical explanatory power of the environmental behavior of leisure agriculture operators and expands the scope of research on leisure agriculture to a certain extent. Secondly, the analytical framework of planned behavior theory and norm activation model is introduced into the field of leisure agriculture to investigate the relevant factors that may affect the environmental behavior of leisure agriculture operators, which is conducive

to accelerating the pace of green development of leisure agriculture and promoting a better ecological environment.

Literature Review

Environmental Behavior

As environmental problems have become more prominent, scholars have gradually paid more attention to environmental behavior. There are narrow and broad definitions of "environmental behavior". Environmental behavior in a narrow sense refers to positive, active solutions to environmental problems [6-8]. The generalized environmental behavior includes not only the behavior of actively solving environmental problems, but also the behavior of destroying the environment. For example, Wang et al. (2022) believes that environmental behavior mainly refers to human social behavior that has an effect on the environment and has a certain impact on the environment, as well as the interaction among various social behavior subjects [9]. Cui et al. (2010) believe that environmental behavior is a kind of social behavior, and the results of environmental behavior include three aspects: environmental influence behavior, environmental protection behavior, and environmental destruction behavior [10].

Through the synthesis of scholars' research, it is found that environmental behavior influencing factors are mainly divided into two aspects: intrinsic influencing factors and extrinsic influencing factors. Intrinsic factors mainly include environmental attitudes, environmental norms, environmental awareness, environmental responsibility, etc. For example, Boubonari (2013) argues that there is a positive relationship between environmental behavior and environmental attitudes [11]. Dale et al. (2014) studied five major factors of tourists' pro-environment behaviors, including habits, environmental attitudes, available facilities, environmental responsibility and social responsibility, and found that habit factors have the strongest influence on environmental behaviors [12]. External factors mainly include social environment, behavioral cost, social field, government and so on. For example, Katherine (2017) et al. believe that social norms are decisive factors supporting environmental behavior [13]. Oakley and Salam (2014) found through the investigation of 234 samples that computer-mediated social networks have a significant impact on environmental behavior [14]. Yang et al. (2018) believe that subjective well-being and perceived social justice are directly related to environmental behaviors, so a good social environment can further stimulate individuals to implement pro-environmental behaviors [15]. Zhang et al. (2019) believe that the government can adopt rigid and flexible measures, such as economic incentive policies, administrative intervention and induction, to encourage people to implement environmental behaviors [16].

TPB and NAM

The theory of planned behavior first originated from Fishbein's Theory of Multi-Attribute Attitudes (TMA), which argues that individuals first develop internal expectations, which in turn shape their perceptions of behavior and eventually generate behavioral intentions [17]. On this basis, Fishbein proposed the Theory of Reasoned Action (TRA), which argues that attitudes and subjective norms determine willingness and willingness determines behavior [18]. Ajzen proposed the Theory of Planned Behavior (TPB) based on Fishbein's proposed theory, which considered the influence of the external environment, management interventions, and other factors on behavior, and added perceived behavioral control variables [19, 20]. As one of the mainstream theories in social psychology, the theory of planned behavior is widely used to explain people's behavioral intentions and predict their behavioral tendencies [21]. Gradually, in recent years, researchers have also used this as a basis for the analysis of environmental behavior. For example, Zhang (2021) introduced consequence perception and attention prediction variables to extend the theory of planned behavior based on a hierarchy of needs theory and resource scarcity to study construction workers' pro-environmental behavioral intentions [22]. Juliana (2022) applied the theory of planned behavior to citizen recycling practices and how to adhere to the Sustainable Development Goals (SDG) as a way of exploring the factors that influence recycling behavior [23].

The norm activation model (NAM) was first proposed in 1977 by Schwartz, who argued that when behavior is inconsistent with self-interest, individuals will still perform the behavior due to moral factors [24]. The norm activation model, which emphasizes the role of morality more than the theory of planned behavior, is a classic model for explaining public environmental awareness and behavior and has been widely used in studies related to the environmental field [25]. For instance, Pradhananga et al. (2019) apply a moral obligation model to understand farmer decision-making related to water resource management, focusing in particular on conservation tillage and drainage management [26]. Bamberg et al. (2007) used the norm activation model to analyze the factors that influence the choice of public transportation in Germany and showed that individual norms are important influences in the decision to choose public transportation [27]. Teng (2022) used the norm activation model to study the voluntary pro-environmental behavior of rural residents in the Jiangxi region as an example [28]. Liu (2022) introduced social norms and ecological values into the NAM theoretical framework to study residents' willingness to separate household waste [29].

The theory of planned behavior places more emphasis on the rational person assumption, which holds that individuals make decisions based on the benefit maximization principle and carefully consider

the costs and benefits before taking action, while the norm activation model places more emphasis on the sense of moral obligation, which holds that individuals have altruistic tendencies and consider the interests of others when making decisions. They are two of the most frequently used and persuasive theories in the field of behavioral science. Some studies have shown that combining the theory of planned behavior with the norm activation model can significantly improve the explanatory power of environmental intentions or behaviors. For example, Zhang (2017) used a theoretical framework combining the theory of planned behavior and the norm activation model to explore the factors influencing citizens' intention to file environmental complaints [30]. Cheng et al. (2020) established an integrated TPB-NAM research framework to explore the influence mechanisms of villagers' participation in rural micro landscapes using structural equation modeling based on data from 414 villagers in a survey on rural micro landscape construction in Jinjiang City [31].

Through combing the relevant theoretical literature, that scholars' research on the environmental behavior of leisure agriculture mainly focuses on the factors influencing environmental behavior, the existence of ecological and environmental problems and solution strategies, etc. Few scholars directly study leisure agriculture from the microscopic perspective of the environmental behavior of operators, and it is even rare to integrate the theory of planned behavior and the norm activation model to study the environmental behavior of operators of leisure agriculture. Therefore, combining two well-known behavioral models, the Theory of Planned Behavior (TPB) and the Norm Activation Model (NAM), a complete theoretical model is proposed to provide a new direction for a more in-depth and comprehensive inquiry into the factors influencing the environmental behavior of leisure agriculture operators. The research results are conducive to the deepening and expansion of research related to the environmental behavior of leisure agriculture operators, and at the same time, can provide a reference basis and experience for the healthy development of leisure agriculture to a certain extent, which has important theoretical and practical significance for promoting the sustainable development of leisure agriculture.

Methods and Materials

Theoretical Basis and Research Hypothesis

The Theory of Planned Behavior

The Theory of Planned Behavior (TPB) based on the Theory of Reasoned Action (TRA), according to Ajzen's theory, individual willingness to act (INT) is influenced by three factors: attitudes (ATT), subjective norms (SN), and perceived behavioral control (PBC) [32]. The ATT is an individual's positive or negative evaluation and perception of performing a particular behavior. Guo et al. (2022) argued that growers' attitudes toward the environment promote the implementation of their environmental behaviors [33]. Barr (2003) argues that environmental attitudes have a significant impact on the formation of environmental values and that attitudes have an indirect effect on environmental behavior [34]. Generally speaking, when leisure agriculture business subjects hold more positive attitudes toward environmental behavior, their willingness to implement environmental behavior is higher. Therefore, attitudes have a positive influence on the environmental behaviors of leisure agriculture business subjects. In summary, hypothesis 1 is formulated:

H1: ATT has a significant positive effect on the environmental behavior of leisure agriculture operators.

The SN is a psychological tendency expressed by an individual when faced with social pressure to perform a particular behavior. Banerjee et al. (2003) studied the environmental regime of industrial firms and concluded that the pressure of community residents positively influenced the implementation of environmental behavior by industrial firms [35]. Wang et al. (2022) using sample data from Xinjiang, it was concluded that the government's policy orientation significantly and positively influenced farmers' willingness to produce green agriculture [36]. Therefore, when the leisure agriculture business subject is limited by objective factors, the higher the degree of pressure exerted by stakeholders such as the government, community residents, the public, and competitors on the leisure agriculture business organization, the more likely it is to implement environmental behaviors. In summary, hypothesis 2 is formulated:

H2: SN has a significant positive effect on the environmental behavior of leisure agriculture operators.

Perceived behavioral control (PBC) refers to how easy or difficult it is for an individual to perform a particular behavior. When an individual feels that it is easier to perform a particular behavior, the willingness to perform it is higher. When individuals feel that it is difficult to perform a particular behavior, they are less willing to perform it. For example, Wang et al. (2022) argued that waterfowl farmers are more likely to perform environmental behaviors when they believe they have the relevant knowledge and have sufficient financial and technical support [37]. Hou et al. (2015) verified that perceived behavior control can significantly affect farmers' low-carbon production intention by using dispersed farmer samples from five cities (counties) around Taihu Basin [38]. Yu et al. (2018) built a behavioral model of farmers' participation in fallow by introducing the theory of planned behavior, and found that farmers' fallow behavioral intention was closely related to perceived behavioral control [39]. Therefore, when leisure agriculture business subjects have a higher degree of environmental knowledge, more channels for environmental information collection, and more types and means of environmental technologies, they are

more likely to implement environmental behaviors. In summary, hypothesis 3 is formulated:

H3: PBC has a significant positive effect on the environmental behavior of leisure agriculture operators.

The Norm-Activation Model

Schwartz proposed the Norm Activation Model (NAM) in 1977 [24]. Its important components include personal norms (PN), awareness of consequences (AC), and the ascription of responsibility (AR). The theory suggests that personal norms (PN) have a determinant role in the production of pro-social (environmental) behavior, that personal norms are individuals' beliefs about the correctness of behavior [40], and that the activation of personal norms is mainly influenced by two variables: outcome consciousness (AC) and responsibility attribution (AR).

Personal norms (PN) refer to the self-expectations and self-requirements of individuals to implement specific behaviors in social groups, and are the expression of internalized social norms. In a study of air travelers' willingness to pay for carbon offsets, Zhang (2017) found that personal norms have a significant positive effect on willingness to pay for carbon offsets [41]. Wang (2017) found through her study that personal norms have a significant positive impact on the intention to participate in environmental governance [42]. The implementation of environmental behaviors by leisure agriculture operators is consistent with environmental social responsibility and is a pro-environmental behavior, and their behaviors are consistent with the self-expectations of leisure agriculture operators. In summary, hypothesis 4 is formulated:

H4: The PN of leisure agriculture operators has a significant positive effect on the willingness of environmental behavior of leisure agriculture operators.

AC refers to the individual's perception of the possible positive or negative results of performing the act; AR refers to the individual's sense of responsibility that arises after performing the act [43]. In their study of pro-environmental intentions of marine aquaculture enterprises, Qin (2020) found that outcome awareness had a significant positive effect on both personal norms and responsibility attribution, while responsibility attribution also had a significant positive effect on managers' personal norms [38]. When a leisure agriculture business subject is aware of the negative consequences of not implementing environmental behaviors and believes that he has the responsibility to implement environmental behaviors and improve the ecological environment, his self-expectation and moral responsibility to implement environmental behaviors will be stronger. Conversely, if the leisure agriculture operators are not aware of the negative impact of not implementing environmental behaviors and adopt an irrelevant attitude toward implementing environmental behaviors, they will not implement environmental behaviors.

In summary, hypothesis H5-H7 is proposed:

H5: AC of leisure agriculture operators has a significant positive effect on PN.

H6: AR of leisure agriculture operators has a significant positive effect on PN.

H7: AC of leisure agriculture operators has a significant positive effect on AR.

Integration of TPB-NAM Theoretical Framework

Combining the theory of planned behavior and the norm activation model can better predict and explain individual environmental behavior [44]. According to the integrated model view of the theory of planned behavior and the norm activation model, an individual's awareness of the consequences of a particular behavior affects whether and to what extent the attitude he or she holds toward the particular behavior is positive. Zhang et al. (2017) asserted that an individual with great awareness of the positive consequences of performing a specific behavior will be more likely to form favorable judgments about the behavior [45]. In other words, as AC reflects an individual's beliefs about the attitude toward the object, then it can be regarded as a determinant of his attitude toward the object [46]. This fact can be extended to the environmental behavior of leisure agriculture business subjects. Leisure agriculture business subjects will have more positive attitudes if they believe that implementing environmental behaviors can reduce pollution mitigation and conserve the use of resources; the stronger the perception of the negative consequences caused by not implementing environmental behaviors, the more they will increase the environmental information collection channel ring, pursue higher environmental information platforms, and learn more types and means of environmental technologies, so the high perception of outcome awareness will increase perceptual behavior control [47].

In summary, hypotheses H8-H9 are proposed:

H8: AC of leisure agriculture operators has a significant positive effect on ATT.

H9: The AC of leisure agriculture operators has a significant positive effect on PBC.

Subjective norms are antecedent variables to Personal norms [48]. Park and Ha (2014) concluded that SN had a significant positive effect on PN [44]. Therefore, the stronger the subjective normative perception of leisure agriculture business subjects, the stronger the sense of responsibility for their environmental behavior and the higher the degree of personal norms. In summary, hypotheses H10-H11 are proposed:

H10: SN of leisure agriculture operators has a significant positive effect on PN.

H11: SN of leisure agriculture business subjects has a significant positive effect on AR.

Based on the above analysis, the theoretical analysis framework in the paper is shown in Fig. 1.
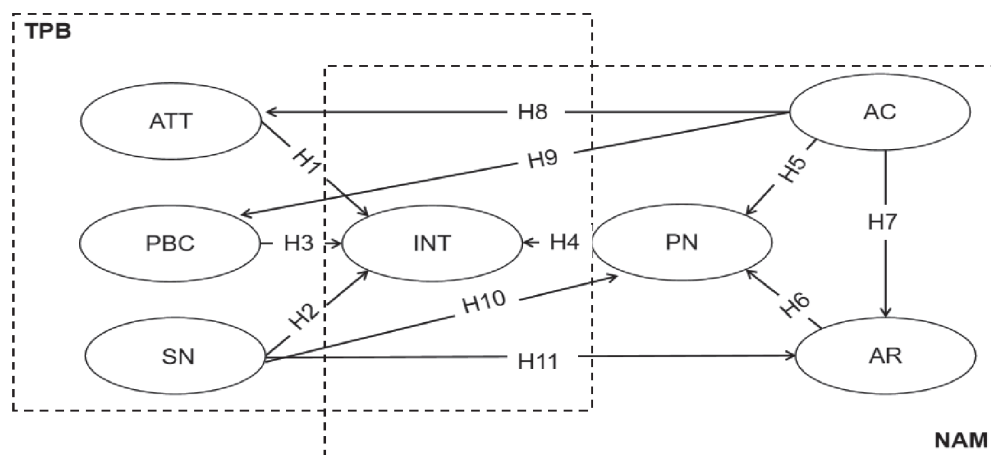
Fig. 1. Theoretical assumption model.

Questionnaire Design

The questionnaire is mainly divided into two parts: the first part is the basic information about leisure agriculture business entities. It mainly includes five aspects, such as geographical location, organization scale, organization and management mode, organization form, and operation years. The second part is to analyze the factors influencing the environmental behavior willingness of leisure agriculture business subjects based on the TPB-NAM integration framework. Six variables, including attitude (ATT), subjective norm (SN), perceptual behavior control (PBC), personal norm (PN), outcome consciousness (AC), and responsibility attribution (AR), were analyzed in detail for their influence size, mechanism and path on the willingness of environmental behavior of leisure agriculture business subjects, and the "five-point Likert scale method " for scoring, with a scale of 1-5, 1 being strongly disagreed, 2 not quite agreeing, 3 being neutral, 4 relatively agreeing, and 5 strongly agreeing. The final questionnaire items were borrowed from established foreign scales and appropriately modified according to the specific research context (Table1). The questionnaires for the measurement of ATT, SN, and PBC were adapted from Rezaei et al. [49], and the questionnaires for the measurement of PN, AC, and AR were adapted from the scale of Han [50].

Questionnaires and Data Sources

This study used a combination of online and practical research methods to conduct research and distribute questionnaires on the environmental behavior of leisure agriculture operators in Huzhou City, Zhejiang Province from June 2022 to September 2022. The questionnaires were distributed online in the form of questionnaire star, and offline in the form of visit survey and interview method. A total of 347 questionnaires were distributed, of which 187 were collected online and 148 were collected offline, resulting

in 335 valid questionnaires, with a valid rate of 96.54%. The specific characteristics of the sample are shown in Table 2.

Results and Discussion

Reliability and Validity Tests

The reliability of a questionnaire is generally assessed using Cronbach's alpha coefficient, which is between 0 and 1. A coefficient of 0.7 or above indicates a reasonable questionnaire design [51]. Exploratory factor analysis of the measurement questions was conducted by SPSS 26.0 software, and the validated factor analysis of each measurement variable showed (Table 3) that the Cronbach's alpha coefficient and combined reliability of each latent variable were greater than 0.7, the convergent validity AVE value was above 0.7, and the factor loadings of each indicator were in the range of 0.748-0.917, indicating that the variable settings, as well as the selection of observation indicators, have good reliability and validity.

Model Fitness Test

The results show (Table 4) that the structural equation model (SEM) fits well. Except for the Comparative fitting index (CFI) (0.868<0.90), all the other fitting indexes met the threshold conditions and pass the fitness test, indicating that the theoretical model proposed in this paper matches the actual survey data, and the SEM and standardized parameter estimation results are finally obtained (Fig. 2).

Structural Model and Hypothesis Testing

The results of the structural model showed that all relationships were statistically significant, i.e., hypothesis H9 was not supported, except for no significant relationship between outcome awareness

Table 1. Variable descriptions.

Variable (Average value)	No.	Measurement questions	Average	Standard deviation
ATT (3.879)	ATT1	Conducting environmental behavior is valuable	3.785	0.632
	ATT2	It makes sense to implement environmental protection practices	3.754	0.743
	ATT3	Own mission to implement environmental protection behavior	4.099	0.790
SN (3.356)	SN1	The high demand for environmental protection from the community motivates me to implement environmental behaviors	3.225	0.969
	SN2	Public demand for green agricultural products and a good ecological environment motivates me to implement environmental behaviors	3.236	0.665
	SN3	The improvement of environmental performance of competitors motivates me to implement environmental behaviors	3.518	0.837
	SN4	The concern of government agencies for environmental performance motivates me to practice environmental behavior	3.445	0.924
PBC (3.619)	PBC1	Environmental information collection channels	3.634	0.721
	PBC2	Environmental information platform	3.738	0.682
	PBC3	Types and means of environmental technologies	3.487	0.758
PN (3.387)	PN1	Implementing environmental behavior is consistent with environmental social responsibility	3.424	0.754
	PN2	Implementing environmental practices is consistent with my values	3.351	0.637
AC (3.187)	AC1	Cost saving and profit increase due to environmental practices	3.319	0.954
	AC2	I can attract more investment by implementing environmental practices	3.579	0.737
	AC3	I can get preferential environmental policies because of environmental practices	3.584	0.733
	AC4	Environmental behavior can win a good market image and enhance market competitiveness	3.267	0.931
AR (3.846)	AR1	I am responsible for the damage to the environmental quality of leisure agriculture caused by the non-environmental practices	3.545	0.878
	AR2	I feel responsible for implementing environmental behaviors in order to reduce pollution of the environment	4.147	0.805
INT (3.505)	INT1	Plan to implement pro-environmental behaviors as soon as possible	3.822	0.825
	INT2	Willing to spend time and effort to implement pro-environmental behaviors	3.188	0.628

Table 2. Sample data characteristics of leisure agriculture business organizations.

Basic Features	Options	Number	Percentage
Organization size	≤10 people	42	12.54%
	11-50 people	194	57.91%
	50-100 people	62	18.51%
	>100 people	37	11.04%
Management style	Self-management	204	60.90%
	Delegated Management	75	22.39%
	Contract Management	56	16.72%
Organizational form	Leisure Agriculture Business	169	50.45%
	Leisure Agriculture Cooperative	95	28.36%
	Self-employed	71	21.19%

Table 2. Continued.

Operating Year	Less than 3 years	46	13.73%
	3-5 years	173	51.64%
	5-10 years	88	26.27%
	10 years or more	39	11.64%

Table 3. Reliability, validity and factor analysis results of variables.

Variable	No.	Factor loading	AVE	Cronbach's α	CR
ATT	ATT1	0.846	0.724	0.865	0.887
	ATT2	0.826			
	ATT3	0.881			
SN	SN1	0.917	0.732	0.902	0.916
	SN2	0.895			
	SN3	0.854			
	SN4	0.748			
PBC	PBC1	0.862	0.771	0.854	0.909
	PBC2	0.891			
	PBC3	0.881			
PN	PN1	0.887	0.767	0.837	0.868
	PN2	0.865			
AC	AC1	0.873	0.737	0.815	0.917
	AC2	0.891			
	AC3	0.785			
	AC4	0.881			
AR	AR1	0.852	0.725	0.884	0.725
	AR2	0.847			
INT	INT1	0.851	0.721	0.847	0.723
	INT2	0.845			

Table 4. Results of model fitness tests.

Type of statistical test index	Results	Judgment Criteria
χ^2/df	1.836	<2.00
RMR	0.042	<0.05
RMSEA	0.065	<0.08
CFI	0.868	>0.90
GFI	0.905	>0.90
NFI	0.949	>0.90
AGFI	0.913	>0.90
TLI	0.924	>0.90

and perceptual behavior control of leisure agriculture operators, which was supported (Table 5).

The results show that the path coefficient of behavioral attitudes and willingness to engage in environmental behaviors in leisure agriculture is 0.554 and significant at the 1% level, and behavioral attitudes have a significant positive influence on environmental behaviors of leisure agriculture business subjects, and hypothesis H1 holds. Meanwhile, among the factors that directly affect the environmental behavior willingness of leisure agriculture business subjects, the standardized path coefficient of behavioral attitude is the largest, indicating that behavioral attitude has an important role in the implicit or explicit behavior of leisure agriculture business subjects.

Subjective norms reduce the environmental behavior willingness of leisure agriculture business subjects with a path coefficient of -0.246, which is contrary to hypothesis H2 that subjective norms have a significant positive effect on the environmental behavior of leisure agriculture business subjects, probably because when leisure agriculture business subjects are under great social pressure, they will develop a rebellious mentality and when social pressure is in a gradual and slow state, leisure agriculture business subjects will only have time to internalize it, thus influencing their own individual norms, responsibility attributions, and thus their willingness to behave environmentally. The path coefficients of subjective norms of personal norms and responsibility attribution are 0.368 and 0.621, respectively, and it is assumed that H10 and H11 hold. When the environment where the leisure agriculture operators are located has a strong atmosphere of encouraging the implementation of environmental behaviors, the leisure agriculture operators will be influenced by their eyes and ears and gradually form the values, sense of responsibility, and sense of obligation to implement environmental behaviors. Thus, subjective norms influence the environmental behavioral intentions of leisure agriculture operators through the following paths: SN→PN→INT; SN→AR→PN→INT.

The path coefficient of perceived behavioral control on the environmental behavior willingness of leisure agriculture business subjects is 0.285 and significant at the 1% level, indicating a significant positive effect and hypothesis H3 holds. When leisure agriculture business subjects perceive more environmental information collection channels, better environmental information platforms, and more types and means of environmental technologies, they will be more proactive in implementing environmental behaviors.

The path coefficient of personal norms of leisure agriculture business subjects on willingness to behave environmentally is 0.247 and is significant at the 1% level, indicating a significant positive effect, and hypothesis H4 holds. The sense of responsibility and values of leisure agriculture business subjects are the basic variables that determine the willingness to environmental behavior of leisure agriculture business subjects. It is indispensable to analyze the influence of individual norms based on the perspective of individual beliefs. Higher individual norms will prompt leisure agriculture business subjects to have a sense of pride when implementing environmental behaviors and increase their sense of guilt when not implementing environmental behaviors, thus increasing the willingness of leisure agriculture business subjects to conduct environmental behaviors and thus influencing their environmental behaviors.

The path coefficients of outcome awareness of leisure agriculture business subjects on personal norms and responsibility attribution are 0.315 and 0.342, respectively, and significant at the 1% level, and hypotheses H5 and H7 hold. When leisure agriculture business subjects are aware of the negative consequences of not implementing environmental behaviors and believe that they have the responsibility to implement environmental behaviors to improve the ecological environment, their self-expectation and moral responsibility to implement environmental behaviors will be stronger, and the more they will implement environmental behaviors.

Awareness of results can improve the attitude of leisure agriculture business subjects with a path coefficient of 0.321, and hypothesis H8 holds. When leisure agriculture business subjects recognize the positive results of implementing environmental behaviors, they will have positive attitudes and

Table 5. Structural model path coefficients and hypothesis testing.

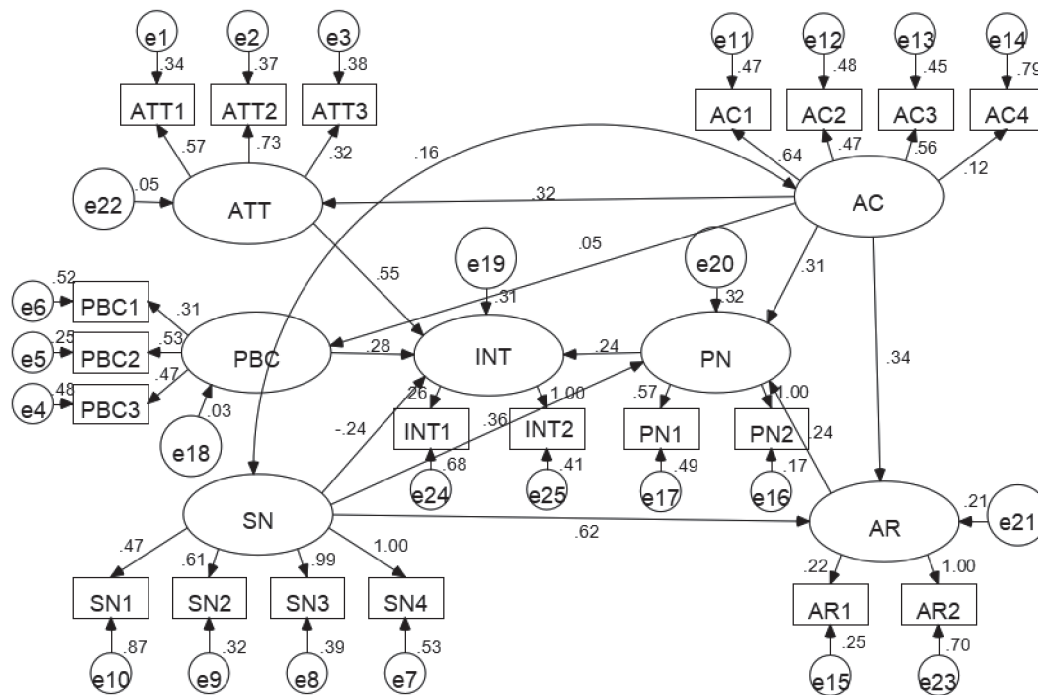| Hypotheses	β	C.R.	P	Results
H1: ATT → INT	0.554	11.495	***	Supported
H2: SN → INT	-0.246	-3.347	***	Supported
H3: PBC → INT	0.285	7.106	***	Supported
H4: PN → INT	0.247	5.244	***	Supported
H5: AC → PN	0.315	7.316	***	Supported
H6: AR → PN	0.243	9.746	***	Supported
H7: AC → AR	0.342	8.533	***	Supported
H8: AC → ATT	0.321	7.687	***	Supported
H9: AC → SN	0.056	2.829	0.05	Not supported
H10: SN → PN	0.368	9.746	***	Supported
H11: SN → AR	0.621	9.660	***	Supported

Note: Here *** represents p<0.001.

Fig. 2. Structural equation model and normalized path coefficient diagram.

a stronger willingness to implement environmental behaviors. The positive effect of outcome awareness on perceptual behavior control is not significant, and hypothesis H9 does not hold. According to the composition of perceived behavioral control (PBC), if leisure agriculture business subjects cannot overcome the lack of internal knowledge and skills and the low controllability of external resource acquisition faced by pro-environmental behavior, then the motivation for pro-environmental behavior will be reduced. Although leisure agriculture operators recognize the consequences of not implementing environmental behaviors, they are not able to implement environmental behaviors well because of the small size of the organization and lack of sufficient funds and policies. Therefore, the resultant cognition influences the environmental behavior willingness of leisure agriculture operators through the following paths: AC→PN→INT; AC→AR→PN→INT; AC→ATT→INT.

The attribution of responsibility to individual norms path coefficient of leisure agriculture business subjects is 0.243 and significant at the 1% level, and hypothesis H6 holds. AC and AR are important variables that make up the NAM and indirectly influence willingness to behave environmentally through individual norms, and when leisure agriculture business subjects are responsible for the damage to the environmental quality of leisure agriculture caused by not implementing environmental behaviors and for reducing the pollution of the environment, their s individual norms are activated, which in turn affects the willingness to behave environmentally. Therefore, the attribution of responsibility influences the willingness of recreational

agricultural operators to behave environmentally through the following paths: AR→PN→INT.

Conclusions

Using the research data of leisure agriculture business subjects, an organically integrated Theory of Planned Behavior and Norm Activation Model (TPB-NAM) was constructed to explore the factors influencing the environmental behavior willingness of leisure agriculture business subjects and analyzed using structural equation modeling, and the findings of the study are as follows.

(1) The TPB-NAM analysis framework combines rationality and morality, and analyzes the influence of the variables in the framework on the willingness of environmental behavior of leisure agriculture operators from the dual perspective of self-interest and altruism, and explains the decision-making process of environmental behavior of leisure agriculture operators more comprehensively, which is an extension of the traditional TPB theory. It provides a multidimensional perspective for further exploring the environmental behavior of leisure agriculture business subjects in the follow-up.

(2) This study clarifies the relationship among the variables in the TPB-NAM analysis framework. The study found that ATT had the largest effect on the willingness to engage in environmental behavior. The effect of AR and PN on the willingness of leisure agriculture operators to engage in environmental behavior was relatively small.

(3) ATT, PBC and PN of leisure agriculture operators are the direct factors to determine INT. SN indirectly influences the environmental behavior willingness of leisure agriculture operators through PN and AR. AC can indirectly influence the environmental behavior willingness of leisure agriculture operators through ATT, PN and AR. AR indirectly influences the environmental behavior willingness of leisure agriculture operators through PN.

Based on the above findings, the paper draws the following insights:

(1) Pay attention to publicity and education, enhance environmental awareness, and cultivate a positive attitude. On the one hand, corresponding measures should be taken to cultivate the positive attitude of leisure agriculture operators to implement environmental behavior. Through television, radio, We Chat group and agricultural network platform, we can publicize and educate the environmental protection knowledge of leisure agriculture business entities, emphasize the economic and ecological benefits of environmental behavior, and cultivate their positive attitude. On the other hand, it is necessary to educate the leisure agriculture business entities not to implement environmental behavior to cause ecological environment damage.

(2) Increase government support and promote environmental protection innovation. First, improve the construction of infrastructure for leisure agriculture, broaden the channels for collecting environmental information, build an environmental information platform, tilt the project and funding arrangements toward leisure agriculture business entities, and encourage more social capital to participate in them. At the same time, strengthen scientific and technological support, focus on key common technologies such as production management, technology management and effect evaluation, strengthen scientific guidance to leisure agriculture business entities pro-environment, encourage innovative environmental protection technologies and methods, promote environmental protection innovation, and improve the efficiency and effectiveness of environmental protection.

(3) Strengthen the awareness of results and stimulate the sense of moral responsibility for protecting the environment. First, enhance managers' cognition of the environment, prompt leisure agriculture business subjects to form correct values, stimulate their altruistic motives and sense of responsibility for environmental protection, and second, establish an environmental protection system to make environmental protection the responsibility of every employee by integrating it into all aspects of leisure agriculture business subjects, and enhance employees' sense of responsibility for environmental protection. Lastly, to break the inherent perception of pro-environmental behavior of leisure agriculture business subjects, to reduce their risk perception, to raise their awareness of responsibility and results of environmental protection, and to actively enhance their willingness to implement environmental behavior.

Author Contributions

X.W. wrote the manuscript, and F.Z. contributed to manuscript revision, read, and approved the submitted version. W.Z. revised the format of the manuscript and corrected grammatical errors.

Data Availability Statement

The data presented in this study are available upon request from the corresponding author.

Conflicts of Interest

The authors declare no conflict of interest.

References

1. DUBOIS C., CAWLEY M., Schmitz S. The tourist on the farm: a muddled image. Tourism Management, **59** (April), 298, **2017**.
2. YU F., ZHOU B., CAO S. Evaluation of the competitiveness of leisure agriculture and the path of improvement-taking Feng Hua City, Zhejiang Province as an example. Science and Technology and Management, **16** (3), 8, **2014**.
3. LI Y., LI S., XU P. Research on the realization path of moderate scale operation of urban leisure agriculture. Chinese Journal of Ecological Agriculture, **29** (10), 1742, **2021**.
4. GUO M., LI J., FENG X. Research on the innovative development of leisure agriculture in Beijing under the Internet environment. Agricultural Modernization Research, **40** (02), 189, **2019**.
5. TAN Z. Study on the development of leisure agriculture in Chengdu. China Agricultural Resources and Zoning, **38** (02), 231, **2017**.
6. HINES M ., HUNGERFORD R., TOMERA N. Analysis and Synthesis of Research on Responsible Environmental Behavior: A Meta-Analysis [J]. The Journal of Environmental Education, **18** (2), 1, **2010**.
7. PAUL C. New Environmental Theories: Toward a Coherent Theory of Environmentally Significant Behavior. Journal of Social Issues, **56** (3), 407, **2000**.
8. SEBASTIAN. Twenty years after Hines, Hunger ford and Tomer: a new meta-analysis of psycho-social determinants

of pro-environmental behavior. Journal of Environmental Psychology, **27** (1), 14, **2007**.

9. WANG Y., JIAO Y., ZHOU W. Ecological guilt and willingness to revisit in desert tourism-a masking effect based on pro-environmental behavior. Geographical Research and Development, **41** (06), 117, **2022**.

10. CUI F., TANG G. Environmental sociology: a sociological interpretation of environmental behavior. Journal of Social Sciences, (03), 45, **2010**.

11. BOUBONARI T., MARKOS A., KEVREKIDIS T. Greek Pre-Service Teachers' Knowledge, Attitudes, and Environmental Behavior Toward Marine Pollution. The Journal of Environmental Education, **44** (4), 232, **2013**.

12. DALE M., BILL M., ALEXANDRA C. Sustainable urban tourism: understanding and developing visitor pro-environmental behaviours. Journal of Sustainable Tourism, **23** (1), 37, **2015**.

13. KATHERINE F., GILLES G., LISETTE I. Social Norms and Pro-environmental Behavior: A Review of the Evidence. Ecological Economics, **140**, 1, **2017**.

14. SALAM O. Examining the impact of computer mediated social networks on individual consumerism environmental behaviors. Computers in Human Behavior, **35** (6), 516, **2014**.

15. YANG K., HU P. Social equity perception, subjective well-being and pro-environmental behavior-a mechanism analysis based on CGSS2013. Arid Zone Resources and Environment, **32** (2), 15, **2018**.

16. ZHANG H., ZHU P. Study on the mechanism of induced commitment in pro-environmental behavior. China Environmental Management, **11** (2), 106, **2019**.

17. FISHBEIN M. An Investigation of the relationships between beliefs about an object and the attitude toward that object. Human Relations, **16** (3), 233, **1963**.

18. Hill R., Fishbein M., Ajzen I. Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research. Contemporary Sociology, **6** (2), 244, **1977**.

19. AJZEN I. The theory of planned behavior. Organizational Behavior and Human Decision Processes, **50** (2), 179, **1991**.

20. MA M., CHEN Y., DU J. Research on the mechanism of environmental innovation behavior formation of FDI firms-an explanatory framework based on the theory of planned behavior. Science and Technology Management Research, **38** (9), 158, **2018**.

21. GAO L., WANG S., LI J. Application of the extended theory of planned behavior to understand individual's energy saving behavior in workplaces. Resources, Conservation and Recycling, **127**, 107, **2017**.

22. ZHANG H., QI H., SHI S., YANG Z. A study on construction workers' willingness to engage in pro-environmental behavior-Based on TPB theoretical framework. Project Management Technology, **19** (09), 52, **2021**.

23. JULIANA N., LADA S., CHEKIMA B. Exploring Determinants Shaping Recycling Behavior Using an Extended Theory of Planned Behavior Model: An Empirical Study of Households in Sabah, Malaysia. Sustainability, **14** (8), 4628, **2022**.

24. SCHWARTZ S H. Normative influences on altruism. Advances in Experimental Social Psychology, **10**, 221, **1977**.

25. HAN H. Travelers' pro-environmental behavior in a green lodging context: Converging value-belief-norm theory and the theory of planned behavior. Tourism Management, **47**, 164, **2015**.

26. PRADHANANGA, A., DAVENPORT, M. Predicting Farmer Adoption of Water Conservation Practices Using a Norm-Based Moral Obligation Model. Environ. Manage, **64** (4), 483, **2019**.

27. BAMBERG S., HUNECKE M., BLOBAUM A. Social context, personal norms and the use of public transportation: Two field studies. Journal of Environmental Psychology, **27** (3), 190, **2007**.

28. TENG Y., JIN Y., FAN X., LIU C. A study on voluntary pro-environmental behavior of rural residents based on norm activation theory-an example of national ecological civilization pilot area (Jiangxi). Journal of Xinjiang University of Finance and Economics, (02), 25, **2022**.

29. LIU C., WANG J., TENG Y. A study on the voluntary sorting behavior of rural residents' domestic waste based on normative activation theory: an example from Jiangxi Province, a national ecological civilization pilot area. Journal of Wuxi College of Commerce and Technology, **22** (02), 41, **2022**.

30. ZHANG X., GENG G., SUN P. Determinants and implications of citizens' environmental complaint in China: Integrating theory of planned behavior and norm activation model. Journal of Cleaner Production, **166** (10), 148, **2017**.

31. CHENG H., RUI Q., YU K., LI X., LIU J. Exploring the Influencing Paths of Villagers' Participation in the Creation of Micro-Landscapes: An Integrative Model of Theory of Planned Behavior and Norm Activation Theory. Frontiers in Psychology, **13**, 862109, **2022**.

32. AJZEN I. The theory of planned behavior. Organizational Behavior and Human Decision Processes, **55**, 179, **1991**.

33. GUO Q., LI H., LI S. Analysis of psychological drivers of farmers' pro-environmental behavior. Arid Zone Resources and Environment, **36** (06), 56, **2022**.

34. BARR S. Strategies for sustainability citizens and responsible environmental behavior. Area, **5** (3), 227, **2003**.

35. BANERJEE S., IYER E., KASHYAP K. Corporate Environmentalism: Antecedents and Influence of Industry Type. Journal of Marketing, **67** (2), 18604, **2003**.

36. WANG X., CHEN Y., ZHAO J. SEM-based study of farmers' green agricultural production behavior-evidence from 352 sample farmers in Xinjiang. China Agricultural Resources and Zoning, **43** (04), 67, **2022**.

37. WANG X., PENG D., TANG J., GAO X.P. A study of waterfowl farmers' willingness and behavior to use feed additives under rule constraints based on TPB-NAM integrated model. Agricultural Modernization Research, **43** (2), 202, **2022**.

38. HOU B., YING R. Y. Research on decentralized farmers' low-carbon production behavior decision-making: An empirical analysis based on TPB and SEM. Agricultural Technical Economics, (2), 4-13, **2015**.

39. YU Z.N., TAN Y.Z., LIAN Q. Based on the theory of planned behavior, this paper analyzes the behavior of farmers participating in the fallow treatment of heavy metal polluted farmland. Transactions of the Chinese Society of Agricultural Engineering, **34** (24), 266, **2018**.

40. QIN M., DU Y., WAN P. A study on pro-environmental willingness of marine aquatic enterprises based on TPB-NAM integration. China Population-Resources and Environment, **30** (9), 75, **2020**.

41. ZHANG Y., CUI F., WU S. A study on the factors influencing air travelers' willingness to pay carbon offsets-an integrated research framework based on the theory of planned behavior and normative activation theory. Arid Zone Resources and Environment, **31** (11), 9, **2017**.

42. WANG L., ZHANG X. Analysis of factors influencing urban residents' participation in environmental governance behavior-Based on planned behavior and norm activation theory. Journal of Hunan Agricultural University (Social Science Edition), **18** (6), 92, **2017**.

43. SHALOM H., SCHWAR T. Normative influences on altruism. Advances in Experimental Social Psychology, **10**, 221, **1977**.

44. AJZEN I. Understanding Attitudes and Predicting Social Behavior, 1rd ed.; New Jersey: Prentice Hall, 156, **1980**.

45. ZHANG X., GENG G., SUN P. Determinants and implications of citizens' environmental complaint in China: Integrating theory of planned behavior and norm activation model. Journal of Cleaner Production, **166**, 148, **2017**.

46. PARK J., HA S. Understanding consumer recycling behavior: Combining the theory of planned behavior and the norm activation model. Family and Consumer Sciences Research Journal, **42** (3), 278, **2014**.

47. CUI Y. Study on the influencing factors of farmers' domestic waste disposal behavior and its effects-Based on an extended theoretical framework of planned behavior. Arid Zone Resources and Environment, **32** (4), 37, **2018**.

48. BAMBERG S., MÖSER G. Twenty years after Hines, Hungerford, and Tomera: a new meta-analysis of psycho-social determinants of pro-environmental behavior. Environ. Psychol, **27**, 14, **2007**.

49. REZAEI R., SAFA L., DAMALAS C. Drivers of farmers'intention to use integrated pest management: Integrating theory of planned behavior and norm activation model. Journal of Environmental Management, **236**, 328, **2019**.

50. HAN H. The norm activation model and theory-broadening: Individuals' decision-making on environmentally-responsible convention attendance. Journal of Environmental Psychology, **40**, 462, **2014**.

51. EISINGA R., GROTENHUIS M., PELZER B. The reliability of a two-item scale: Pearson, Cronbach, or Spearman-Brown. International Journal of Public Health, **58** (4), 637, **2013**.