

Research on Farmers' Adoption Intention to E-Commerce of Agricultural Products Based on UTAUT Model

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Abstract

In order to improve the predicament of low e-commerce adoption rate in rural areas, it is necessary to study the influence mechanism of farmers' agricultural products e-commerce adoption. Introduce the two variables of perceived risk and human resources, construct an extended integrated theory of acceptance and use of technology (UTAUT), the data of farmers were obtained through field surveys in X County, Hunan Province, and structural equations models were used to test hypotheses. The results show that performance expectations, social influence, and human resources significantly positively affect farmers' adoption intention to e-commerce of agricultural products, perceived risks negatively affect farmers' adoption intention to agricultural products e-commerce, convenience conditions and adoption intention significantly positively promote farmers' adoption of agricultural products e-commerce. It is proposed that infrastructure construction should be strengthened, farmers' awareness of e-commerce and e-commerce skills should be improved, and suggestions for fostering and supporting E-commerce newcomers. The above results provide policy guidance basis for promoting the development of agricultural products e-commerce.

Keywords: *Farmer; E-commerce of agricultural products; UTAUT; Adoption intention; behavior*

I. Introduction

Rural e-commerce, as an important part of e-commerce, has played an important role in optimizing rural industrial structure and increasing farmers' income. In recent years, the central government has repeatedly emphasized "promoting the development of e-commerce in rural areas" and frequently issued supporting policies, which has led to the rapid development of e-commerce in rural areas in China. According to the report, in 2019, China's rural online retail sales amounted to 1.7 trillion yuan, an increase of 19.1% over the previous year. Although the e-commerce market of agricultural products has begun to take shape, it still has the problem of low penetration. The penetration rate of e-commerce to agricultural products is less than 4%, far lower than 20% of apparel and 3C categories, indicating that the development space of e-commerce for agricultural products is very large^[1]. Therefore, further promoting the development of the e-commerce of the farm products is of great significance to promote the circulation of the farm products, solve the problem of selling them, increase their income and push the development of the rural economy. However, in many rural areas, there are few farmers who adopt e-commerce, and most of them are small farmers who have online stores with small scale. In view of this, it is necessary to study the influencing mechanism of farmers' adoption of agricultural products e-commerce.

In the past, scholars refined the adoption of e-commerce according to subjects, including agricultural enterprises, new-type agricultural business subjects, family farmers, rural professional large households and small farmers, and mostly conducted research on professional farmers in the research group. Li Xiaojing^[2] and Tang Liqiang^[3] respectively studied kiwifruit growers in Sichuan and Shaanxi and strawberry farmers in Liaoning Province. In research methods, structural equation model and binary logistics regression model are mostly used. In model selection, most scholars use the technology acceptance model (TAM) as the basic framework, and introduce other variables according to the differences of the adoption subject and situation. Gao Kai^[4] introduced perceived risk variables based on technology acceptance model to study users' intention to use regional agricultural products e-

commerce platform. Guo Jinyong^[5] based on the extended TAM model and the theory of perceived risk, confirmed the negative effect of perceived risk on adoption intention. Lyu Dan^[6] studied the main body of new agricultural management by integrating several theories, and the results showed that human resources were the primary factor affecting the adoption of e-commerce. The research of Zhu Honggen^[7] also confirmed that human resources can promote the adoption of e-commerce. In addition, some scholars have adopted the unified theory of acceptance and use of technology (UTAUT) to study the adoption behavior of e-commerce. Tian Xiao^[8] conducted research based on UTAUT, and found that all four dimensions have significant influence on user adoption. Yu Shouhua^[9] and Zhang Quanyu^[10] expanded UTAUT by adding perceived risk and other variables, and confirmed the significant influence of perceived risk and other variables on use behavior.

To sum up, scholars have done a lot of work in e-commerce adoption research, with rich research results and still room for expansion. On the research subject, scholars have paid attention to different e-commerce adoption groups from multiple perspectives, but they mostly concentrated on "large farmers" and professional growers, lacking attention to ordinary small farmers. From the perspective of research, many scholars have paid attention to the impact of perceived risk and human resources on the adoption of e-commerce, but no research has brought them into the same framework. In model selection, scholars mainly use TAM to explain the influencing factors of individual e-commerce. However, TAM's applicability is affected due to its lack of consideration of external variables and its simplicity and theorization in practical research. UTAUT is an integration of eight theoretical models, such as TAM, with a comprehensive research perspective and higher explanatory power. Based on the above analysis, ordinary farmers are selected as the research object, and UTAUT with higher explanation rate of behavior and intention is adopted. By introducing two variables of perceived risk and human resources, the adoption intention model of farmers' e-commerce for agricultural products based on UTAUT is constructed to study the impact mechanism of ordinary farmers' participation in e-commerce for agricultural products in a more in-depth and comprehensive way, which makes up the deficiency of previous e-commerce adoption research on farmers' groups, broadens the research horizon of rural e-commerce adoption, and also provides guidance basis for promoting the development of e-commerce for agricultural products.

II. Theoretical Basis and Research Hypotheses

2.1 UTAUT model

To explain and predict users' technology use behavior, eight theoretical models, such as Theory of Planned Behavior (TPB), rational behavior theory, technology acceptance model and innovation diffusion theory, have been put forward in academic circles. However, it is found in the practical application that the eight models have different focuses, with problems of single perspective and incomplete elements in the study of technology use intention and behavior, which greatly reduces the explanatory power of the model^[11]. Therefore, Venkatesh organically integrated eight models to construct an UTAUT model, which contains four core indicators, namely performance expectation, effort expectation, social influence and convenience, among which the first three affect actual behavior by influencing behavior will, while the last one directly affects actual behavior. Scholars tested UTAUT and found that compared with the previous models' 17%-53% interpretation ability of user behavior, the interpretation ability of the new model was significantly improved to 70%, indicating that UTAUT was significantly better than the eight separate models in the analysis and prediction of user's technology use behavior.

Some scholars have suggested that external variables should be introduced to improve the explanatory power of individual e-commerce adoption intention according to different adoption subjects and situations^[5], indicating that the original model should be revised according to the actual situation when using UTAUT for research. As e-commerce is a modern transaction method, which requires farmers' knowledge and skills, farmers' adoption of e-commerce will be affected by their own human resources. Secondly, e-commerce transactions are implemented in a virtual environment, which brings convenience but also risks^[12]. Farmers with low education and lack of risk-taking prefer to avoid risks, so perceived risk is an important factor to consider when making decisions. In view of

the above analysis, on the basis of UTAUT, two variables, perceived risk and human resources, were introduced in this paper to modify the original model adaptively, so as to better explain farmers' adoption behavior of agricultural products e-commerce. Fig. 1 shows the research model.

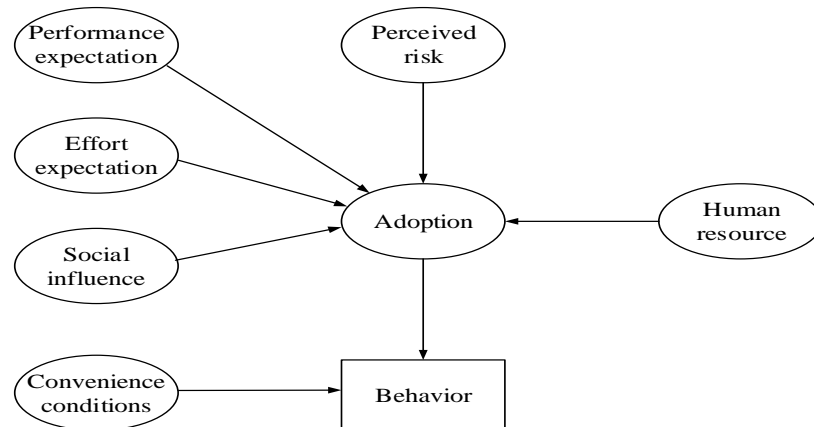


Fig. 1 Research model diagram

2.2 Research hypotheses

Based on literature review and combing, the eight variables in the above research model were analyzed and described below.

Performance expectation refers to the extent to which individuals believe that the use of new systems or technologies will help improve job performance, reflecting users' perception of the utility of new technologies. If users believe that the use of new technologies can bring benefits and help to themselves, such perceived expectation can promote their intention to use^[13]. Similarly, if farmers think that e-commerce can promote the sales of agricultural products or increase their income, they may have a stronger adoption intention them. Thus, the following hypothesis is made:

H1: Performance expectation positively affects farmers' adoption intention to e-commerce of agricultural products. Effort expectation refers to the degree of effort that an individual considers necessary to use a new technology or a new system, which reflects the user's perception of the difficulty of using the technology. Some studies have found that users' adoption intention a certain technology is directly related to the difficulty of mastering the technology that if farmers think that it is easy to learn and use e-commerce technology without spending too much time and energy, their adoption intention to e-commerce will increase. Thus, the following hypothesis is made:

H2: Effort expectation positively affects farmers' adoption intention to e-commerce of agricultural products.

Social influence refers to the degree of influence of social groups on individual behavior, which can be divided into two categories, one is the influence of mass media, such as newspapers, television and other secondary information sources that play an important role in the adoption of some information technologies^[14], and the other is the influence of social network relations such as relatives and friends, acquaintances and village cadres on people's willingness to act. When modern farmers adopt e-commerce, they are more easily influenced by the opinions of their families and surrounding people, including the incentives or constraints of the government and relevant organizations^[15]. As the main body of adoption, farmers are more willing to trust family, relatives and friends^[16]. Thus, the following hypothesis is made:

H3: Social influence positively affects farmers' adoption intention to e-commerce of agricultural products.

Convenience conditions refers to the degree to which users feel the support of information systems or information technology^[17]. As farmers need corresponding infrastructure and supporting conditions to develop e-commerce, the more complete the software and hardware conditions to support the development of e-commerce, the less difficulties operators feel in developing e-commerce, and the higher their enthusiasm for adopting e-commerce. According to Wang Li's research, conveniences positively affect the users' behavior of 3G services^[18]. Thus, the following hypothesis is made:

H4: Conveniences conditions positively affect farmers' adoption intention to e-commerce of agricultural products. People are unable to determine the possible impact of any behavior on the results due to uncertain factors, which is defined as the perceived risk^[19]. Hassan divided perceived risk into eight categories: finance, function, time, society, psychology, body, source and privacy^[20]. It is found that perceived risk has a significant negative impact on users' intention to use agricultural e-commerce^[21]. In the e-commerce environment, when users perceive the risks of logistics delay, product quality not meeting expectations and personal privacy being leaked, they will reduce their intention to use^[9], that is, the greater the perceived risks and uncertainties when farmers consider e-commerce, the lower their adoption intention. Thus, the following hypothesis is made:

H5: Perceived risk negatively affect farmers' adoption intention to e-commerce of agricultural products.

Human resources refer to the resource endowments possessed by individuals or families, including relevant experience possessed by families and knowledge and skills possessed by family members. The more relevant family experience, the stronger the ability of members, and the stronger their adoption intention technology^[22]. Theoretically, farmers with human resources, knowledge and skills and relevant marketing experience to support e-commerce will be easier to master e-commerce technology and solve problems encountered. It is obvious that whether farmers decide to adopt e-commerce depends on their own resources. Zhou Xunzhang^[23] found that farmers' personal endowment promotes their adoption of e-commerce, and Ma Zebo^[24] also confirmed that farmers' endowment influences e-commerce participation. The above studies have shown that there is a significant correlation between human resources and farmers' behavioral intention, so the following hypothesis is made:

H6: Human resources positively affect farmers' adoption intention to e-commerce of agricultural products.

One's behavioral intention will affect his actual behavior. In fact, many studies have proved that behavioral intention positively affects use behavior. In agricultural products e-commerce, adoption intention will also have an impact on adoption behavior that the stronger the farmers' adoption intention, the more likely they are to adopt e-commerce of agricultural products. Thus, the following hypothesis is made:

H7: Adoption intention positively affects farmers' behavior to e-commerce of agricultural products.

III. Empirical Analysis

3.1 Questionnaire design

In this study, the questionnaire was used as the main measurement method, and a five-level Likert scale was used, with 1 to 5 corresponding to "completely disagree", "disagree", "generally", "agree" and "completely agree" respectively. The questionnaire items were all derived from the existing literature, and combined with the opinions of agricultural experts and farmers in the preliminary research, the scale language was improved to be suitable for the situation of this study, and to ensure the content validity of the scale. The questionnaire design is shown in Table 1. ("E-commerce" in the form refers to "e-commerce of agricultural products").

Table 1 Measurement items and reference sources

Dimensions of variables	Items	Reference sources
Performance expectation	I think adopting e-commerce can increase income.	Venkatesh ^[25]
	I think adopting e-commerce can reduce transaction costs.	
Effort expectation	I think adopting e-commerce can increase sales.	Venkatesh ^[25] Tian Xiao ^[8]
	I think the cost of studying e-commerce is lower.	
Social influence	I think the consultation and training is thorough and satisfactory in service.	Venkatesh ^[25] Zhang Quanyu ^[10]
	I think financial lending is convenient and quick.	
	Neighborhood, relatives and friends encourage and support me to adopt e-commerce.	
	Acquaintances or relatives adopt e-commerce to get rich.	
Convenience conditions	The government or the village committee encourages me to participate in e-commerce	Venkatesh ^[25] Zhang Quanyu ^[10]
	Newspapers, Internet and other media promote e-commerce to get rich.	
Perceived risks	I think our village has perfect network facilities.	Tian Xiao ^[8]
	I think our village has perfect logistics facilities.	
	I think our village has perfect road facilities.	
Human resources	I'm afraid that the e-commerce will cause financial losses	Gao Kai ^[4] Bauer R A ^[19]
	I'm afraid e-commerce will cause privacy leaks	
Adoption intention	I'm worried about after-sales in e-commerce	Lv Dan ^[6]
	I (my family) have human resources to support e-commerce.	
Behaviors	I (my family) have the knowledge and skills to support e-commerce.	Venkatesh ^[25]
	I (my family) have experience in Internet marketing.	
	I would like to encourage people around me to adopt e-commerce	
	I think adoption of e-commerce benefits a lot	
	I am willing to adopt e-commerce	
	I have adopted e-commerce	

3.2 Data collection and descriptive statistics

In this paper, the data comes from the field investigation in X County, Hunan Province from January to February, 2021. Seven townships were randomly selected from X County by random sampling, and 2-3 villages were randomly selected from each township, and questionnaires were distributed to farmers for oral explanation. A total of 300 questionnaires were distributed, 278 were recovered, and 265 valid questionnaires were retained after excluding the invalid ones, with an effective rate of 88.3%. The basic information of the surveyed personnel is shown in Table 2.

Table 2 Demographic variable table of surveyed farmers

Category	Variables	Frequency	Percentage
Gender	Male	172	64.9
	Female	93	35.1
Age	Below 30 years old	42	15.8
	30-40 years old	73	27.5

	40-50 years old	60	22.6
	50-60 years old	49	18.5
	Over 60 years old	41	15.5
Educational level	Primary school education	60	22.6
	Junior high school education	114	43
	Senior high school education	65	24.5
	Junior college or bachelor education	21	7.9
	Above bachelor	5	1.9
Planting area	Less than 3mu	41	15.5
	3-5mu	64	24.2
	5-8mu	75	28.3
	8-10mu	51	19.2
	More than 10mu	34	12.8
	Total	265	100.0

Table 2 shows that the gender of farmers is concentrated in men, accounting for 64.9%, which is in line with the tradition that most men are in charge in rural areas of China. Farmers are concentrated in the age range of 30-60 years old, which is basically in line with the current situation that a large number of young rural laborers flow out and middle-aged and elderly people stay at home. The education level of farmers is the highest in junior high school, followed by primary school and senior high school, and there are relatively few highly educated talents in rural areas. The planting area of farmers is mainly 3-8mu, which is in line with the characteristics of small farmers in rural areas. The above data show that the basic characteristics of the surveyed farmers are similar to the actual situation in rural China, which is representative to a certain extent and meets the research needs.

3.3 Data analysis

3.3.1 Reliability and validity analysis

In this paper, SPSS20.0 and AMOS22.0 were used for empirical analysis. Firstly, the reliability and validity of the sample data were analyzed. In Table 3, the Cronbach's α coefficient and composite reliability values of each latent variable are greater than 0.7, indicating that the internal consistency of the scale is good and the reliability of the questionnaire is good. All the items in this paper are measured by mature scale or available literature, this the questionnaire has good content validity. In order to measure the structural validity, a confirmatory factor analysis was carried out on the measurement model. As shown in Table 3, the load factors were all greater than 0.6, and the average variation extraction values were all greater than the critical value of 0.5, indicating that the scale has a good convergence validity. Table 4 shows that the square root of the mean variance extraction value of each variable is greater than the correlation coefficient between this variable and other variables, and the scale has good discrimination validity. To sum up, the reliability and validity of the questionnaire have passed the test, and it is suitable for further analysis.

Table 3 Reliability and validity results

Factors	Indicators	Factor loading	Cronbach's α coefficient	Mean variant extraction	Composite reliability
Performance expectation	A1	0.826	0.853	0.662	0.855
	A2	0.783			
	A3	0.831			
Effort expectation	E1	0.757	0.773	0.535	0.775
	E2	0.732			
	E3	0.704			
Social influence	S1	0.739	0.835	0.565	0.837

	S2	0.87			
	S3	0.689			
	S4	0.693			
Convenience conditions	C1	0.82			
	C2	0.817	0.867	0.687	0.868
	C3	0.849			
Perceived risks	W1	0.775			
	W2	0.779	0.769	0.540	0.778
	W3	0.643			
Human resources	T1	0.715			
	T2	0.795	0.783	0.556	0.790
	T3	0.725			
Adoption intention	B1	0.894			
	B2	0.785	0.892	0.732	0.891
	B3	0.884			

Table 4 Discrimination validity test results

Variables	Performance expectation	Effort expectation	Social influence	Convenience conditions	Perceived risks	Human resource	Adoption intention
Performance expectation	0.814						
Effort expectation	0.270	0.731					
Social influence	0.427	0.347	0.751				
Convenience conditions	0.491	0.370	0.572	0.829			
Perceived risks	-0.481	-0.288	-0.462	-0.421	0.735		
Human resource	0.458	0.271	0.409	0.527	-0.403	0.746	
Adoption intention	0.758	0.358	0.716	0.678	-0.629	0.651	0.856

Note: The values on the diagonal are the square root of the mean variation extraction value, those not on the diagonal are correlation coefficients.

3.3.2 Model fitting testing

The goodness-of-fit index was obtained by structural equation path test of the research model. As shown in Table 5, the chi-square freedom ratio is 1.753, which is less than 3, indicating a good fit. The mean square root of the progressive residual is 0.053, which is less than 0.08, indicating a good fit. The contracted fitness index is 0.674, which is greater than 0.5, indicating a good fit. Value-added adaptation index and comparative adaptation index are both greater than 0.9, indicating that the fitting is good. After adjustment, the fitness index is 0.859, which is greater than 0.8, indicating a good fit. Although the standard fit index, benign fit index and adjusted good fit index are all slightly less than 0.9, they are in an acceptable state. Generally speaking, the model fits well.

Table 5 The results of structural equation model suitability

Fitting indexes	Proposed values	Structural model values	Goodness-of-fit
Chi-square freedom ratio	<2	1.753	Good
Standardized residual mean square root	<0.05	0.0424	Good
Mean square root of progressive residual	<0.08	0.053	Good
Standard fit index	>0.9	0.898	Acceptable
Value-added fit index	>0.9	0.953	Good
Comparative fit index	>0.9	0.953	Good
Benign fit index	>0.9	0.893	Acceptable
Adjusted benign fit index	>0.8	0.859	Good
Simple fit index	>0.5	0.674	Good

3.3.3 Hypotheses testing

The path test results of the model were obtained by software analysis. Table 6 shows that the standardized path coefficients of performance expectation-adoption intention, social influence-adoption intention, perceived risk-adoption intention and human resources-adoption intention are 0.384, 0.408, -0.17 and 0.226, respectively, which are all significant at the statistical level of 0.001. The standardized path coefficients of convenience conditions-behavior and adoption intention -behavior are 0.261 and 0.664, respectively, which are significant at the statistical level of 0.001. The path test of expectation- behavioral intention is not significant, and the hypothesis fails.

Table 6 The results of structural equation path test

Paths	Standardized path coefficients	Non-standardized path coefficients	Critical ratio	Significance P value
Performance expectation-adoption intention	0.384	0.422	7.477	***
Effort expectation-adoption intention	0.054	0.082	1.28	0.201
Social influence-adoption intention	0.408	0.488	7.641	***
Perceived risk-adoption intention	-0.17	-0.253	-3.331	***
Human resources-adoption intention	0.226	0.316	4.587	***
Convenience conditions -behavior	0.261	0.149	4.866	***
Adoption intention -behavior	0.664	0.283	11.75	***

Note: * * * means significant at the statistical level of 1%.

3.3.4 Analysis on empirical results

According to the analysis of the model results, the research hypotheses H1, H3, H4, H5, H6 and H7 were verified, that is, farmers' adoption intention is significantly positively influenced by performance expectation, social influence and human resources, and significantly negatively influenced by perceived risk; The adoption behavior of farmers is significantly positively affected by the adoption intention and convenience conditions. Research hypothesis H2 fails to pass the test, i.e., performance expectation has no significant impact on the adoption intention.

The standard path coefficient of performance expectation- adoption intention is 0.384, indicating that performance

expectation can significantly promote the adoption of agricultural products e-commerce, and farmers attach great importance to the benefits brought by e-commerce. Therefore, if farmers perceive that e-commerce can increase profits, they will actively adopt e-commerce. In this study, the increase of income and sales volume and the decrease of cost will lead to the increase of profits, so these factors significantly enhance farmers' adoption intention.

Effort expectation has no significant impact on farmers' adoption intention, probably because higher effort expectation will lead farmers to think that the more help they can get from e-commerce, but this does not help farmers directly solve the difficulties they face, such as their lack of knowledge and skills. Farmers, as rational economic people, often consider the maximization of income while ignoring the influence of the operating cost of e-commerce. In addition, it may be related to the small sample size and the weak development of e-commerce support services in the survey area.

Social influence-the adoption intention has the largest path coefficient, indicating that social influence is the primary factor that affects the adoption intention of farmers' e-commerce of agricultural products. Because it is an acquaintance society in China's rural areas where the villagers have close relations and frequent exchanges, and the credibility of the news that people around use e-commerce to get rich and the accessibility of technology will encourage farmers to follow suit. The rapid dissemination of information and the close contact between farmers can greatly improve the success rate of imitation behavior, reduce the learning cost and risk loss in the process of imitation, and facilitate the dissemination of e-commerce experience. Therefore, the e-commerce deeds and attitudes of people around have a significant impact on farmers' e-commerce adoption.

The path coefficient of perceived risk-adoption intention is negative, which indicates that perceived risk significantly negatively affects farmers' adoption intention to e-commerce of agricultural products. Because most farmers tend to be conservative and risk-averse, and are unfamiliar with e-commerce, they are more likely to perceive risks and choose to avoid them. E-commerce adopts online virtual transaction mode, which is full of unknowns and uncertainties for farmers accustomed to traditional transaction mode. Therefore, their concerns about property safety, privacy safety and return of goods in online transactions are all important factors hindering the adoption of farmers' e-commerce.

The standardized path coefficient of human resources-adoption intention is 0.226, indicating that farmers' resource endowments have a significant role in promoting their adoption intention to agricultural e-commerce. E-commerce, as a modern transaction mode, requires participating farmers to have certain knowledge and skills. Farmers are usually more self-efficient after having the advantage of human resources, and they are more willing to try and participate in e-commerce. Moreover, farmers' knowledge, skills and marketing experience related to e-commerce also make them more advantageous in developing e-commerce.

Convenience conditions significantly positively affects farmers' adoption behavior of agricultural products e-commerce, indicating that infrastructure is an important condition for e-commerce. E-commerce, as an online transaction mode, is highly dependent on infrastructure such as road traffic, network and logistics, because online communication and transaction depend on fast and smooth network, and offline goods transportation cannot be separated from undeveloped road traffic and efficient logistics, indicating that the primary task to develop rural e-commerce is to improve rural e-commerce infrastructure.

The standardized path coefficient of adoption intention-behavior is 0.664, which shows that farmers' behavior is significantly and positively influenced by adoption intention, consistent with psychological cognition, that is, individual behavior intention affects behavior decision-making.

IV. Suggestions

The development of e-commerce for agricultural products is of great significance in promoting the circulation of agricultural products, raising farmers' income and promoting rural economic development, and farmers are an important participant in the development of e-commerce for agricultural products. Therefore, exploring the influencing factors of farmers' e-commerce adoption of agricultural products is beneficial to solving the problem of low adoption rate of farmers' e-commerce. Therefore, based on the results of the above empirical analysis, in order

to improve farmers' willingness to adopt e-commerce of agricultural products and promote more farmers' participation, the following suggestions are put forward:

4.1 Increasing investment in rural infrastructure construction and creating a good environment for e-commerce development.

The empirical results show that convenience conditions significantly affects farmers' adoption intention to e-commerce of agricultural products. Since infrastructure such as road transportation, network and logistics is the foundation of e-commerce development, to improve farmers' adoption intention to e-commerce, the first priority is to increase investment in rural infrastructure construction, such as strengthening rural road transportation investment to ensure smooth roads and convenient travel for villagers, promoting the construction of "Broadband Village" project, expanding the coverage of broadband and mobile communication, cooperating with logistics enterprises, promoting the establishment of rural express stations to reduce rural logistics costs, and providing basic guarantee for the rapid transportation of agricultural products and the smooth development of e-commerce by farmers. In addition, the construction of e-commerce parks should be speeded up to provide free start-up venues for farmers, and the construction of county-level e-commerce public service centers and village-level e-commerce service stations should be gradually promoted to create a favorable e-commerce development environment and provide environmental convenience for farmers to carry out e-commerce.

4.2 Strengthening the training of farmers' e-commerce awareness and skills, and improving the rural e-commerce support service system.

The empirical results show that performance expectation, human resources and perceived risks significantly affect farmers' adoption intention to e-commerce. Because performance expectation perception and risk perception are based on farmers' e-commerce cognition level, while human resource perception is based on farmers' own skill level, to enhance farmers' willingness to adopt, it is necessary to strengthen the training of farmers' e-commerce cognition and e-commerce skills. The government and the media should do a good job in the publicity and promotion of e-commerce, so that farmers can fully realize the benefits and advantages of participating in e-commerce of agricultural products. At the same time, government departments should jointly organize e-commerce enterprises, e-commerce teams of colleges and universities and e-commerce technicians to carry out courses on theoretical knowledge and practical operation of e-commerce, so as to improve farmers' e-commerce cognition and skills and cultivate practical talents of e-commerce. Training methods should adapt to farmers' acceptance ability, and the training content should be easy to learn and useful, so that farmers can really benefit from it. In addition, rural e-commerce supporting service systems such as e-commerce consulting service system, e-commerce supply chain system, agricultural product inspection system and e-commerce financial lending system should be improved to provide thoughtful and comprehensive services for the development of e-commerce of agricultural products and reduce worries for farmers.

4.3 Giving full play to the exemplary role of outstanding e-commerce entrepreneurs and focusing on cultivating and supporting new e-commerce talents.

The empirical results show that social influence significantly promotes farmers' adoption intention to e-commerce, and the experience of getting rich from e-commerce of people around them most obviously promotes farmers' adoption intention to e-commerce, i.e. there are typical "leader effect" and "follower effect" when farmers adopt e-commerce. Therefore, excellent e-commerce merchants can be selected for commendation and encouragement, and their e-commerce deeds can be vigorously publicized through social networks and local media, so as to achieve exemplary role. Village cadres should also do a good job in publicizing e-commerce policies and excellent e-commerce models, and encourage farmers to participate in e-commerce of agricultural products. More importantly, the government should focus on cultivating and supporting newcomers to e-commerce, and should focus on cultivating and supporting farmers with ideas and conditions, and cultivate a group of new e-commerce farmers by carrying out regular e-commerce course training, sharing experience of excellent e-commerce merchants, on-site guidance of professionals, and exchange and study of farmers. In addition, new e-commerce users can be supported to grow rapidly by providing low-interest loans and business start-up subsidies, government publicity and recommendation, e-commerce consulting and other services.

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