

# Analysis of Farmers' Characteristics under the Attitude of Online Purchase of Agricultural Inputs—An Empirical Study Based on 312 Households in Shandong and Anhui Provinces

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**Abstract:** *Online shopping for items needed for agricultural production has become a new agricultural business model, and the development of this model has been influenced by the attitude of rural households towards online shopping. Little literature has studied deeply and systematically rural households' attitudes towards shopping online of agricultural means of production and the influencing factors. This paper analyzes rural households' attitudes towards shopping online of agricultural means of production and causes of formation based on the investigation data of 312 It probes into individual characteristics of respondents, the household It probes into individual characteristics of respondents, the household business characteristics, knowledge of shopping online and the relationship between the cognition of way of shopping online of agricultural means of production and attitude towards shopping online of agricultural means of production. This study finds that some rural households have accepted shopping online of agricultural means of production. However, majority of rural households don't have shopping online willingness. The gender, education level, household planting scale, shopping online knowledge and way of cognition of the gender, education level, household planting scale, shopping online knowledge and way of cognition of respondents have a significant impact on rural households' willingness of shopping online of agricultural means of production. with people who don't want to shop online, people willing to shop online are those that are mainly men, with a higher educational level, a larger household planting scale, a lower cost larger household plant scale, a lower cost per unit area of the annual agricultural purchase, more communication of shopping online experience with their children and a better understanding of shopping.*

**Keywords:** *Agricultural means of production; Shopping online of agricultural means of production; Willingness; Rural household characteristics*

## 1. Introduction

Since Premier Li Keqiang put forward the "Internet +" concept, the agricultural Internet to seize the opportunity, in the face of various e-commerce platforms have entered the rural market, many agricultural enterprises have been an important part of the e-commerce as agricultural marketing change, agricultural network marketing situation is about to open. Agricultural e-commerce aims to break through the limitations of traditional agricultural sales channels with many links and low efficiency, through the combination of traditional agricultural circulation and modern Internet, a greater integration of resources, breaking regional protection and local protection sales model, the implementation of direct connection between agricultural enterprises and farmers, so that farmers can quickly and easily buy quality agricultural products. As can be seen, the development of agricultural e-commerce has a positive effect on both farmers and agricultural enterprises.

Whether the rapid development of agricultural e-commerce, the first depends on whether farmers accept this new form of agricultural business. In the current small-scale operation of China's agricultural families, farmers are generally older and less educated, and rural electricity infrastructure, operation system and service system is not yet perfect background, agricultural electricity can be fully rolled out? Is online shopping for agricultural products already in the pipeline? Which farmers will become the main customers of agri-business? The existing literature has failed to examine these questions in depth. These questions are of great significance to relevant government departments and

enterprises in promoting the healthy development of agricultural e-commerce and expanding agricultural e-commerce business.

To this end, this paper uses the survey data of 312 farmers in Shandong and Anhui provinces as the basis for classifying farmers' attitudes towards online shopping for agricultural products and analysing the reasons for the formation of two types of attitudes: willingness to buy and unwillingness to buy. The article also explores the characteristics of farmers with different attitudes towards online shopping. The article is of direct reference value for agricultural e-commerce companies to predict market prospects and reasonably select target markets. At the same time, it is of exploratory significance to deepen the theoretical research on farmers' online shopping behaviour.

## **2. Literature Review and Research Hypothesis**

### ***2.1. Willingness and willingness to purchase agricultural products online***

Willingness first appeared in social psychology research and is a subjective conceptual representation of individual behavioural intentions<sup>[1][22]</sup> (Zuo, Wenming et al., 2014; Li, Baoku, 2021). Consumer purchase intention is formed by a combination of consumers' personal attitudes towards a product or brand and external factors, reflecting the probability and likelihood of consumers to purchase a product or service<sup>[2]</sup> (Mullet, 1992). The Tripartite Model of Attitude suggests that cognition, emotion and intention are the three dimensions of attitudes. Cognition is based on people's processing and processing of information about the characteristics of the attitude object, forming an objective evaluation and understanding of the attributes of the attitude object, and is more influenced by personal ability and literacy level; emotion refers to people's subjective intuition and evaluation of objective events, rather than based on beliefs about the nature of the attitude object, and is more influenced by context; intention is a behavioural tendency that people show based on their own past experience or observation of others' behaviour of a behavioural tendency<sup>[3][23]</sup> (Feng Xiaoliang et al., 2013; Sun Juan et al., 2019).

The emergence of online shopping, which refers to the purchase of goods or services by consumers via the Internet, has changed the environment and the way consumers shop. In fact, the concept of consumers' willingness to buy online is not too different from the traditional concept of consumers' willingness to buy. Online purchase intention means that consumers do not need to directly touch the physical goods and related services, but rather learn about the goods and services through information such as text descriptions, picture displays and past consumer reviews, which makes it possible for consumers to purchase the products or services<sup>[4][24]</sup> (Li Chun, 2012; Wang Haiyan et al., 2019). Online purchase intention has a significant impact on consumers' online purchase decision making behaviour; the stronger the consumer's intention to purchase online, the greater the chance of online purchase behaviour occurring<sup>[5][25]</sup> (Laaksonen, 1993; Zhang Sifei et al., 2019).

In rural China at present, because the basic network facilities have not yet been improved, the logistics level is not high, and the overall age and education level of farmers are relatively old, farmers are not as convenient as urban consumers to carry out online shopping operations. For this reason, some agricultural e-commerce companies have set up online shopping agent sites in villages and towns to help farmers purchase agricultural materials online. Therefore, farmers do not necessarily purchase agricultural materials online through themselves on the Internet, but can also purchase agricultural materials online through agricultural agent sites on their behalf. For this specific situation in rural communities, this paper defines the willingness to purchase agricultural materials online as the subjective probability of farmers to purchase agricultural materials on the Internet or through an agricultural agency.

### ***2.2. Personal characteristics and willingness to purchase agricultural products online***

Personal characteristic variables include gender, age and education level. Xiong Suhong et al. (2014) found that women perceive more risk in online shopping than men, and female consumers are more risk-averse, thus men are more willing to shop online than women<sup>[6]</sup>. However, it has also been noted that women have lower labour opportunity costs and are likely to be willing to accept new things and technologies<sup>[7]</sup> (Wang Qi et al., 2012). Older farmers tend to be more conservative in their thinking and are too bound to try new things<sup>[8]</sup> (Chu, Chengbing and Li, Ping, 2014). In particular, the quality of agricultural products, which are important inputs for agricultural production, is directly related to the farmers' annual harvest. As a result, older farmers are reluctant to try to buy agricultural materials

online compared to younger farmers. The higher the level of education of a farmer, the more receptive he or she is to new things and knowledge.<sup>[9]</sup> (Guo, Hongdong and Jiang, 2004). Therefore, this paper proposes the following hypothesis:

H1: Personal characteristics variables have a significant effect on farmers' willingness to purchase agricultural products online.

H1a: Gender has a significant effect on farmers' willingness to purchase agricultural products online.

H1b: Age has a significant effect on farmers' willingness to purchase agricultural products online.

H1c: There is a significant effect of literacy level on farmers' willingness to purchase agricultural products online.

### ***2.3. Farmers' household business characteristics and willingness to purchase agricultural materials online***

The variables that characterise farming households include average annual household income, the proportion of income from farming, average annual expenditure on farming materials per unit area, and the current scale of cultivation. Farmers with a high average annual household income are likely to be large local farmers, "competent" growers or educated agricultural extension workers, who are more likely to be willing to accept new technologies and new things in rural communities, and more likely to make online purchases of agricultural materials. The share of income from farming refers to the proportion of total household income from farming. According to Huang Wu (2010), the higher the share of agricultural income in total household income, the stronger the willingness of farmers to adopt new technologies.<sup>[10]</sup> Compared to industry and services, China's agriculture is less remunerative, which makes some farmers with a low share of farming less dependent on agriculture (Zhao, Yu and Wu, 2012), thus affecting their farming behaviour and possibly leading to a low willingness to accept online purchases of agricultural materials<sup>[11]</sup>. The size of the planting scale is not only related to the farmers' income, but also to the amount of production costs invested. The "rational small farmer" theory (T. Schultz, 1964; S. Popkin, 1979) suggests that farmers are efficient and financially prudent economists who seek to maximise profits.<sup>[12-13]</sup> As a result, farmers seeking economies of scale increase their agricultural returns by reducing the cost of farming purchases, and thus the greater the farming scale, the greater the likelihood that farmers will be willing to purchase farming supplies online. Similarly, the higher the average annual agricultural expenditure per unit area, the more likely farmers are to purchase agricultural materials online. Therefore, the following hypothesis is proposed in this paper:

H2: Household business characteristics have a significant effect on farmers' willingness to purchase agricultural products online.

H2a: The average annual gross household income has a significant effect on farmers' willingness to purchase agricultural products online.

H2b: The proportion of farming has a significant effect on farming households' willingness to purchase agricultural products online.

H2c: There is a significant effect of the average annual agricultural expenditure per unit area on farmers' willingness to purchase agricultural products online.

H2d: There is a significant effect of current planting size on farmers' willingness to purchase agricultural materials online.

### ***2.4. Knowledge of online shopping and perceptions of agricultural online shopping methods and willingness to shop online for agricultural products***

Farmers' knowledge of online shopping refers to the extent to which farmers know about online shopping, including agricultural online shopping, and the resulting perceptions of agricultural online shopping. For rural characteristics, this paper measures whether or not they share their online shopping experience with their children and whether or not they are aware of online farm shopping. Moschis (1988) suggests that parental consumption behaviour can influence their children through reinforcement, modelling and social interaction<sup>[14]</sup>. The transmission of information, beliefs and resources from one generation to the next in the family is referred to by scholars as "positive

intergenerational influence"<sup>[15]</sup> (He Jiaxun, 2007). In today's new era of technological development, children are more capable of understanding, absorbing and adapting to society than their fathers, and there will be a cultural feed-back effect of the younger generation passing on cultural knowledge to their "fathers"<sup>[16]</sup> (Zhou Xiaohong, 1988), and the behaviour of the fathers is influenced by the children<sup>[17]</sup> (Bai Xianliang, 2003), which is called "reverse intergenerational influence". And at this stage, it is an indisputable fact that the rural labour force is generally older and the overall literacy of farming households is low (Zhang Qingxia and Zhang Shoujin, 2005)<sup>[18]</sup>. Older farmers are much less able to accept and understand new things than their children, and are often influenced by them. Wu Xingxing and Miao Weiya (2007) found through an empirical study that internet usage experience has a positive effect on consumers' willingness to shop online<sup>[19]</sup>. This suggests that the less customers know about online shopping will affect their willingness to buy online. Cognition is the process by which people perceive or process information about external things that act on them. The cognition of a product is the basis for consumers to make purchasing decisions. Consumers make judgments and identify the quality, value and efficacy of a product to form sufficient cognition to decide whether to buy it or not<sup>[20]</sup> (Chen, Xinjian et al., 2014). Research has shown that differences in perceptions have a significant impact on farmers' decision making ability<sup>[21]</sup> (Luo Biliang et al., 2012). Therefore, this paper proposes the following hypothesis:

H3: Knowledge of online shopping has a significant effect on farmers' willingness to purchase agricultural products online.

H3a: Sharing online shopping experiences with children has a significant effect on farmers' willingness to shop online for agricultural products.

H3b: Prior knowledge of agricultural online shopping has a significant effect on farmers' willingness to purchase agricultural products online.

H4: There is a significant effect of the perception of agricultural online shopping methods on farmers' willingness to purchase agricultural products online.

### 3. Study design

#### 3.1. Variable setting

In this paper, farmers' willingness to purchase online is measured by "willingness" and "unwillingness". Farmers' knowledge of online shopping is measured by whether they share their online shopping experience with their children and whether they are aware of online shopping for agricultural products. The detailed assignment of each variable is shown in Table 1.

Table 1: Definition of each variable

Variables	Variable definitions
Willingness to shop online for agricultural products	0 = unwilling; 1 = willing
Gender	0=female; 1=male
Age	Under 40 = 1 (low age group); 40-60 = 2 (middle age group); 60+ = 3 (high age group)
Education level	1 = primary school and below (low education group); 2 = lower secondary school (medium education group); 3 = upper secondary school and above (high education group)
Planting scale	1=3 and under acres (small scale group); 2=3-7 acres (medium scale group); 3=7+ acres (high scale group)
Average annual gross income	1 = \$50,000 and below (low income group); 2 = \$50,000-\$100,000 (middle income group); 3 = \$100,000 and above (high income group)
Share of income from farming	1=20% and below (low ratio restructuring); 2=20% and above (high ratio restructuring)
Agricultural expenditure per unit area	1=\$250 and below (low cost group) 2=250 and above (high cost group)
Share your online shopping experience with your children	0 = no (no exchange group); 1 = yes (exchange group)
Have you heard of online shopping for agricultural products	0 = no (don't know group); 1 = yes (know group)
Awareness of agricultural online shopping methods	1=Computer online shopping group; 2=Mobile online shopping group; 3=Agent station on behalf of online shopping group

### 3.2. Data collection

The sample data for this study were obtained from a questionnaire survey of a sample of farmers in 27 villages in 11 townships in Jining and Heze, Shandong Province and Fuyang City, Anhui Province. A total of 350 questionnaires were distributed and 331 questionnaires were returned, 312 valid questionnaires remained after excluding invalid ones, with an effective rate of 89.1%. The basic characteristics of the respondents are shown in Table 2.

Of the 312 respondents interviewed, 144 (46.2%) were male and 168 (53.8%) were female. In terms of the education level of the interviewed respondents, the overall education level of the respondents was not high. Among them, 42.6% had primary school education, 30.8% had middle school education, 22.8% had no education and only 3.8% had high school education or above. In terms of the age distribution of those surveyed, most farmers aged 51 to 60 accounted for 35.3% of the total, followed by farmers aged 41 to 50 at 30.4%, while farmers aged 61 to 70 accounted for 20.2% and farmers aged 40 and below and over 70 accounted for a total of 14.1%.

Basic information about the surveyed farming households. The average household size of the surveyed farmers was 5.28 persons, with the largest number of families of four, about 27.2%, and the smallest number of people in the surveyed households was 1 and the largest number was 13. The average farming size of each household was 5.94 mu, with the minimum farming area being 0.8 mu and the maximum being 226 mu, with 43.9% of households farming between 3 and 7 mu. The average annual total income of the farming households surveyed was RMB 54,740.38, with the minimum annual income being only RMB 4,000 and the maximum annual income reaching RMB 550,000. Among them, 35.2% had an annual income of \$30,000 to \$50,000, followed by 23.7% of households with an annual income of \$50,000 to \$70,000, and an equal number of households with an annual income of \$10,000 to \$30,000 and \$70,000 or more, accounting for 19.9% of all surveyed households. Farming households with an average annual farm expenditure of RMB250 per acre or less accounted for 67% of the surveyed households, while the rest accounted for 33%. In terms of the proportion of farming, the overall proportion of farming households was not high, with 126 farming households accounting for 10% to 20% of farming, or 40.4% of the total survey respondents.

Table 2: Description of basic respondent characteristics

Variables	Category	Frequency	Frequency (%)	Variables	Category	Frequency	Frequency (%)
Sex	Male	144	46.2	Unit	250 and below	209	67.0
	Don't	Women	168		53.8	Agricultural Spending	250 and above
Year	30 years and under	7	2.2	Planting scale	1 to 3 acres	71	22.8
	31 to 40 years	32	10.3		3 to 7 acres	137	43.9
	41 to 50 years	95	30.4		7 acres or more	104	33.3
	51 to 60 years	110	35.3	Proportion of people working in agriculture	10% and below	92	29.5
61 to 70 years	63	20.2	10% to 20%		126	40.4	
71+ years	5	1.6	20% or more		94	30.1	
Text chemistry Program degree	Illiterate	71	22.8	Year Collection Enter	10,000 and below	4	1.3
	Primary Schools	133	42.6		10 to 30,000	62	19.9
	Junior High School	96	30.8		30,000 to 50,000	110	35.2
	High School	11	3.5		50,000 to 70,000	74	23.7
	High School or above	1	0.3		70,000+	62	19.9

### 3.3. Analytical approach

This study mainly used SPSS19.0 statistical analysis software to analyse the data. Descriptive statistical analysis was used to understand whether farmers' willingness to shop online for agricultural products was common and the reasons that led to positive or negative attitudes of farmers towards online shopping for agricultural products. The analysis also compares the characteristics of farmers who are willing to purchase online with those who are unwilling to purchase online in terms of individual household statistical variables, household business status, knowledge of online shopping and perceptions of online shopping methods.

**4. Data Analysis and Results**

**4.1. Distribution ratio of willingness to purchase agricultural products online and the reasons for their formation**

The surveyed farmers' willingness to purchase agricultural materials online is shown in Table 3. Overall, there were 201 farmers who were not willing to purchase agricultural materials online, accounting for 64.4%, while 111 farmers were willing to purchase agricultural materials online, accounting for only 35.6%. The reasons for the difference are shown in Table 4. Among the 111 farmers who were willing to purchase agricultural materials online, 88 people thought that "online agricultural materials are cheap and affordable", 86 people thought that "buying agricultural materials online is convenient, quick and hassle-free", and 29 people thought that "Some farmers thought that "the quality of agricultural products online is good" and "online shops can provide quality services". Among the farmers who were reluctant to buy agricultural materials online, 135 thought that "the quality of agricultural materials online cannot be guaranteed"; secondly, 95 thought that "online things are invisible and unpredictable, so they are not secure in their hearts"; 91 were reluctant to buy agricultural materials online because of incomplete computer equipment and network facilities. There are also farmers who are used to buying agricultural materials in retail shops and feel that online shopping is not as convenient as buying in retail shops. Other reasons why farmers are reluctant to buy agricultural materials online are that they do not know how to operate them, they cannot keep up with the after-sales service and the online payment is not secure.

To sum up, there is a certain customer base for online purchase of agricultural materials, and some farmers have a positive attitude towards online purchase of agricultural materials, but on the whole, most farmers do not have a strong will to do so, and online purchase of agricultural materials does not show a trend of water to water. The economy, convenience and speed of buying agricultural materials online are the main reasons for attracting some farmers to buy online. The virtual nature of the internet, uncertainty, incomplete facilities and dependence on traditional buying habits are the main reasons for farmers' reluctance to buy online. As farmers are rational economic people who seek to maximise profit, the quality of agricultural materials is related to farmers' annual income, and the virtual network has more uncertainties. Therefore, farmers prefer to choose physical agricultural retail shops to buy agricultural materials, and even if there are quality problems, farmers can directly seek compensation from the retailers.

*Table 3: Farmers' willingness to purchase agricultural materials online*

Willingness to shop online for agricultural products	Overall		Fuyang		Jining		Heze	
	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
Unwillingness	201	64.4	69	73.4	78	64.5	54	55.7
Willing	111	35.6	25	26.6	43	35.5	43	44.3
Total	312	100.0	94	100.0	121	100.0	97	100.0

*Table 4: Reasons for different attitudes towards online shopping for agricultural products*

Willing or not	Cause Analysis	Number of persons	Proportion (%)
May intention	Cheap and affordable online farm supplies	88	36.9
	Buying farming supplies online is convenient, fast and hassle-free	86	36.1
	Wide range of online agricultural brands to choose from	29	12.2
	Online shops can provide a quality service	14	5.9
	Good quality agricultural products purchased online	13	5.5
	Other reasons	8	3.4
No May intention	No guarantee of quality of online agricultural products	135	26.6
	I can't see or touch anything on the internet, so I'm not sure	95	18.7
	Inadequate facilities such as computer equipment and internet access	91	17.9
	used to buying at retail agricultural shops.	80	15.7
	Buying online is not as convenient as in a retail shop	63	12.4
	Other reasons	44	8.7

#### **4.2. Analysis of factors influencing farmers' willingness to buy online**

In this paper, SPSS19.0 software was used to analyze the variables of respondents' personal characteristics, household business characteristics, knowledge of online shopping and cognition of agricultural online shopping methods under different online shopping intentions, and determine whether each characteristic variable has a significant influence on online shopping intentions by means of the chi-square test of cross-linked tables, and the mean value of each of its characteristic variables was integrated to determine its direction of action. The specific analysis is as follows:

In terms of farmers' personal characteristics, gender passed the test at the 1% significance level and positively influenced farmers' willingness to purchase agricultural products online, indicating that men were more willing to purchase agricultural products online than women, and hypothesis H1a was verified. Hypothesis H1a was tested. The age of the farmer had no significant effect on the willingness to purchase agricultural products online. This may be due to the fact that rural farming households are generally older and the variation in the age variable is not significant. Farmers' education level has a positive effect on farmers' willingness to purchase agricultural materials online. As the education level increases, the cognitive level of those with higher education also increases, and they have a higher understanding and acceptance of the new online agricultural materials purchasing and marketing methods. Therefore, hypothesis H1c was verified. In summary, hypothesis H1 was partially verified.

The reason is that in rural areas, agricultural income is lower than that of the secondary and tertiary sectors. As a result, young workers migrate to work, while older people stay in the countryside to farm. Agricultural income is not the main source of income for households, farmers prefer to work part-time, and if farmers work part-time, they will invest less in agriculture. Therefore, hypotheses H2a and H2b are not tested. This is not consistent with the expectation that farmers will cut costs and choose to purchase agricultural materials online. This may be because farmers are worried about the quality of the agricultural materials purchased online, and if quality problems occur, not only will they not be able to increase their income by reducing costs, but they will also suffer greater losses due to faulty agricultural materials. Moreover, it is not easy to trace the responsibility. Therefore, hypothesis H2c is validated. The current farming scale of farmers has a significant impact on farmers' willingness to purchase agricultural products online, and the larger the farming scale of farmers, the more likely farmers are to purchase agricultural products online. Therefore, hypothesis H2d was verified. In summary, hypothesis H2 was partially verified.

In terms of online shopping knowledge characteristics, the exchange of online shopping experience with children has a positive impact on farmers' willingness to purchase agricultural products online. As the older generation is much less receptive to trends and new technologies than the younger generation, this makes the older generation lose the absolute power to educate the next generation in the new environment, and the younger generation influences the attitudes, perceptions and behaviours of the "father's generation". As a result of the reverse intergenerational influence, farmers' intentions and behaviours are influenced by the younger generation. Therefore, hypothesis H3a is tested. Whether or not farmers have heard of online farming has a significant impact on their willingness to purchase farming materials online. Farmers who have heard of online farming are more willing to purchase farming materials online. Farmers' knowledge of online farming deepens their impressions of online farming, so that they will consider online farming when purchasing farming materials. Therefore, hypothesis H3b was verified. In summary, hypothesis H3 passed the test.

There is a significant effect of the perception of agricultural online purchase method on farmers' willingness to purchase agricultural products online. Respondents who perceived that online purchase of agricultural materials was the online purchase of agricultural materials by an agent station on their behalf were significantly more willing to purchase online than those who perceived it to be computer purchase and mobile phone purchase. This is because farmers do not have a high level of trust in the virtual environment of the internet and prefer to go to a physical shop as opposed to buying online. Most of the agricultural online shopping agents are former agricultural retail shops in villages and towns with good sales performance and service attitude, and their staff are also trained agricultural retailers who later cooperate with e-commerce companies to promote agricultural online shopping, thus, out of trust in the retailers, farmers are willing to have the agents purchase agricultural products online for them. In addition, computer equipment and network facilities in rural communities have yet to be perfected. Computers are regarded by farmers as the "big thing" among home appliances and they would not buy them without special needs, and their literacy level is a shortcoming in learning how to operate computers. However, with the rapid development of the mobile phone industry in recent years, especially the promotion of contemporary smart phones, mobile phones have become an indispensable

communication tool in modern human life, only need to open data traffic to access the Internet, many farmers will use mobile phones to browse the web news, some farmers use mobile phone software to charge phone bills, there are farmers use Taobao online shopping. Compared to computers, mobile phones are less costly and do not differ much from computers in terms of basic functions. As a result, farmers are more willing to shop online on their mobile phones than on their computers. Therefore, hypothesis 4 was verified. The empirical results of the model are shown in the following table 5.

Table 5: Columnar analysis of the variables and farmers' willingness to purchase agricultural products online

Independent variable		Group	Average value	Willingness to shop online for agricultural products		Cardinality	Seemingly more than	Sig. value
				Yes	No			
Agriculture households individual People Special Levy	Sex Don't	Female	0.28	47	121	9.175**	9.188	0.002
		Male	0.44	64	80			
	Year Age	Lower age group	0.36	14	25	2.339	2.738	0.320
		Middle age group	0.38	78	127			
		Senior group	0.28	19	49			
	Education level	Low Culture Group	0.30	59	139	7.896**	7.810	0.004
High Culture Group		0.46	52	62				
Agriculture household home Court Scripture Camp Special Levy	Collection Enter	Low income group	0.38	66	110	5.636	5.492	0.06
		Middle Income Group	0.32	41	90			
		High income group	0.75	4	1			
	Planting scale	Low Planting Group	0.34	66	127	7.508*	7.216	0.023
		Medium Planting Group	0.36	25	58			
		High Planting Group	0.50	20	16			
	Share of farming	Low share of farming	0.38	85	139	1.945	1.981	.103
		High share of farming	0.30	26	62			
	Unit Agricultural Spending	Low Cost Group	0.39	82	127	3.695*	3.770	0.035
		High Cost Group	0.28	29	74			
Net Purchase know Knowledge	Online shopping experience exchange	Non-Exchange Group	0.28	69	174	24.727**	23.853	0.000
		Exchange groups	0.61	42	27			
	Online Shopping Know How	Unknown group	0.28	57	149	17.104**	16.832	0.000
		Know Your Group	0.51	54	51			
Acknowledgement of agricultural online shopping methods	Agricultural online shopping methods	Computer Internet shopping	0.33	79	164	8.682*	8.269	0.013
		Mobile Internet Shopping	0.38	17	28			
		Agent Station Online Shopping	0.62	15	9			

Note: \* and \*\* indicate significant at the 5% and 1% levels respectively.

### 5. Conclusions and Recommendations

Based on survey data from 312 farming households in 27 administrative villages in 11 townships in Shandong Province and Anhui Province, this paper analyses farming households' attitudes towards online shopping for agricultural products and their reasons, and examines the effects of farming households' personal characteristics variables, household business characteristics variables, knowledge of online shopping and cognitive variables of agricultural online shopping methods on their willingness to shop online for agricultural products. The main findings of the study are as follows:

First, the number of respondents willing to buy agricultural materials online only accounted for 35.6% of the total, while the number of farmers who were not willing to buy online accounted for 64.4% of the total. This means that the overall willingness of farmers to buy agricultural materials online is not strong, and agricultural materials online shopping has not yet come to fruition, agricultural e-commerce and agricultural enterprises still need to further expand their target groups.

Secondly, gender, education level, planting scale, whether to exchange online shopping experience with children, and whether to know about online agricultural purchase beforehand were significantly positively related to farmers' willingness to purchase agricultural materials online. The average annual purchase cost per unit area was significantly and negatively correlated with farmers' willingness to



purchase online. The perception of online purchase method was related to farmers' willingness to purchase agricultural materials online, and the willingness to purchase agricultural materials online was significantly higher among those who thought that online purchase was purchased by agents on their behalf than those who thought it was purchased by computers and mobile phones.

Thirdly, compared to the group that is not willing to purchase agricultural materials online, the group that is currently willing to purchase online is dominated by men, higher education level, larger family planting scale, lower average annual agricultural purchase cost per unit area, more experience in exchanging online shopping with their children, and some knowledge of agricultural online shopping. The above research findings have certain management implications and policy implications for agricultural e-commerce companies to develop a new situation of agricultural online shopping and for the government to promote changes in the agricultural industry. For agri-business, farmers' willingness to buy online is not strong, mainly due to farmers' low trust in this new type of agricultural purchase and sale, and farmers' fear of taking risks. Therefore, the level of trust in farmers' minds should be improved and the perceived risk of online shopping for agricultural products should be reduced. On the one hand, the agricultural e-commerce company should strictly audit every agricultural enterprise and business stationed on the platform to ensure that they have a certain degree of industry credibility and influence, as well as a good sense of service, and strictly prohibit the entry of counterfeit and fake agricultural enterprises to maintain the order of the agricultural network market. On the other hand, we will strengthen the coverage and service width of the agricultural agency service stations to cultivate farmers' trust in them, which will in turn lead to farmers' trust in agricultural e-commerce and agricultural online shopping. At the same time, we should consciously explore and cultivate "progressive farmers" in rural communities who have a sense of innovation and a leading role to play, and through the publicity and influence of their opinion leaders, drive the behaviour of other farmers in the community in online agricultural shopping, paying special attention to the guidance of farmers who are male, have a higher level of education, have a larger scale of cultivation or spend less on agricultural materials per unit. The campaign will be particularly useful for men, educated farmers, farmers with larger crops or those who spend less per unit. For the government, it should improve the infrastructure network facilities, maintain fair competition in the market and provide the necessary conditions to achieve a seamless connection between farmers and enterprises. As some farmers are reluctant to buy agricultural materials online due to the lack of perfect rural network infrastructure, the government should increase the construction of infrastructure and operation systems, improve the logistics system for agricultural materials circulation and ensure the implementability of agricultural materials online shopping. At the same time, the government should increase the supervision of the production, sale and circulation of agricultural materials to prevent agricultural enterprises from making private profits by unfair competition, and guide the agricultural market towards the trend of benign competition.

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