

# Research on Factors Affecting Farmers' Network Information Consumption

Hailiang Meng<sup>1</sup>, Xinquan Ge<sup>1</sup>, Mingxia Xie<sup>2</sup>

<sup>1</sup>Economics & Management Institution

Beijing Information Science & Technology University China

<sup>2</sup>Beijing Textile Holding Company, LTD

China

{zhongguoren1974, xixixieming}@163.com, xqge2001@yahoo.cn



**ABSTRACT:** Research on farmers' network information consumption behavior is an important issue, which cannot be avoided in Chinese rural informatization construction. Logit model is used to research the factors affecting farmers' network information consumption, and the conclusions are as follows: 1) there are a number of factors affecting farmers' consumption by using modern network information media; 2) environmental characteristics is the main factor affecting farmers' information consumption via modern network information; 3) younger farmers more often use modern network information media; 4) farmers have a clear purpose by using modern network information media in information consumption, that is, to gain benefits by the use of information. The conclusions of this study will provide a reference for the government to solve the problem in the current informatization construction.

**Categories and Subject Descriptors:** K.6 [Management of Computing and Information Systems]: Strategic information systems planning; H.4 [Information Systems Applications]

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Information Access, Information Management

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## 1. Introduction

Chinese rural information construction has already made considerable progress, but many problems have begun

to stand out at the same time. What are the reasons for these problems? Reviewing Chinese information construction, it is not difficult to find that the government is always the protagonist in the construction and practice of a wide range of information services, while farmers just play a minor role. The in-depth study of farmers' information consumption behavior, particularly in-depth study of farmers' network information consumption behavior is an important issue, which cannot be avoided in Chinese rural informatization construction. This study tries to find the key factors of restricting farmers' network information consumption behavior, so as to provide a reference for the government to solve the problem in the current informatization construction.

Domestic and foreign scholars have undertaken extensive research on the factors affecting farmers' information consumption behavior. In the survey of Jiangsu Province, Wang Xuanwen (2003) found the coefficients of three variables, namely, the gender, age and educational level of the farmer, were not significant, indicating that under the conditions of samples selected, no significant correlation between the three variables and the demand of farmers for the paid services of technology promotion was found [1]. Zhang Yunhua, et al (2004) studied the main factors affecting farmers' behavior of using pollution-free and green pesticide, the results showed that the contact between farmers and professional agricultural technical association was favorable for farmers to look for pesticides varieties information [2]. The research of Xiao Hong'an and Tao Li (2008) held that geographical environmental and communications infrastructure, farmers' production scale, family's income source, type of income, educational level, and traditional concept were the main reasons for restricting the needs of farmers on market

information [3]. Sheng Yan (2006) applied the basic theory of information economics to analyze the issue of farmers' inadequate need of information, considering the over-high information searching cost, incomplete agricultural information market and relatively low education background highly contributed to farmers' information needs in face of difficulties [4]. Wang Xiaolan (1999) thought that, due to the restriction of economic status, education level and other basic conditions, farmers had low capacity of information acceptance, digestion and use, so it is very difficult to accept paid technical information service [5]. Xu Shimin (2001) held that, the major factors affecting farmers' sense of information including personal education level, local information infrastructure status, and the situation of information market environment and information services [6]. The study of Ma Saiping, et al (2006) showed that, the high cost of information search, incomplete agricultural information market and relatively low education level of farmers constitute the main reasons of farmers' information needs in face of difficulties [7]. Hou Yanxiang and Fang Yuqi (2003) studied factors affecting information consumption from the perspective of information consumption, considering the barriers of information consumption should include three elements: main factors, objective factors and environmental factors. Among them, the main factors included consumers' psychological factors, economic factors and awareness factors; whereas objective factors were characteristics of the information itself, such as the information intangibility, completeness, usefulness, effectiveness, sharing and dependence; and environmental factors included information market environment, technical environment and humanistic environment [8].

The Multi-Logit model is applied to research the affecting factors of farmers' network information consumption in this paper. The rural information construction in Miyun County is the pioneer suburban counties of Beijing, which is of representative significance; therefore, this county is selected as an example to analyze the influencing factors of farmers' network information consumption behavior in the suburbs of Beijing. This study has been made in the manner of questionnaires and household interviews. The research time was from April to July, 2009. The survey involved 335 households in 12 villages of 4 counties. We investigated 15 village cadres, 7 township cadres, and issued 333 household questionnaires, of which 324 were fed back. Excluding questionnaires with invalid data and incomplete invalid questionnaires, 305 valid questionnaires were obtained finally.

## 2. Research Hypothesis and Model Selection

### 2.1 Research hypothesis

According to the results of the above studies, combined with the actual situation and data availability of farmers in Miyun County, this study assumes that the factors affecting farmers' information consumption selection has four aspects: (1) Personal characteristics of the farmer, such as gender, age, education level, party member or

not. In general, men are more prone to accept information consumption than women; the younger, better educated farmers are more likely to receive information consumption; the party members are easier to consume information. (2) Family characteristics, which are mainly described by the per capita family income and the farmers' bearing capacity of information risk. Theoretically speaking, the higher the household income is, the stronger the risk bearing capacity is, and farmers will be more prone to information consumption. (3) Production characteristics, which are described by family business scale, degree of commercialization and the degree of organization. In general, the 3 variables are in positive correlation with the farmers' information consumption decision. (4) Environmental characteristics, which is described by 5 indicators, namely, the community's information services infrastructure conditions, village cadres' intervention degree in information service, information service payment cost evaluation and information utility. Under normal circumstances, complete information service infrastructure and village cadres' intervention in information services are conducive to information consumption. In addition, the more reasonable the information service cost is, the higher the information utility is, and farmers are more prone to regular information consumption.

### 2.2 Model selection

The first is the selection of independent variables. Based on the above descriptions and hypothesis analysis, the following explanatory variables are introduced: (1)Personal characteristic variables of the farmer: the gender, age, education level, whether being party member or not; (2) Variables of farmer household characteristics: per capita income, farmers capacity of information risk bearing; (3) Production characteristic variables: farmers' management scale, the degree of commercialization, the degree of organization; (4) Environmental characteristic variables: the status of community information infrastructure, the cadres' intervention in information service, information service payment cost evaluation and information utility.

The second is the selection of dependent variables. Farmers' information consumption behavior is the process of a series of behaviors including information search, selection, use and feedback. From the observing and statistical perspective, the study focuses on the research of the affecting factors of "*whether farmers often select such media consumption information*", and regards it as a dependent variable. Among them, "*often*" is defined as the number of annual consumption times of more than 6 (more than 3 times of training reception).

This study divides information acquisition media into two categories, the traditional information acquisition media represented by television, and the modern information acquisition media represented by network. This paper focuses on finding affecting factors of farmers' information consumption via modern network media, and carries out comparative analysis on the differences of the factors of the two media. To this end, the following two models are

established to study the affecting factors of farmers' information consumption behavior: The first model is the model of factors affecting farmers' regular agricultural information acquisition via television; the second model is the model of factors affecting farmers' regular acquisition of the agricultural information via network.

The regular information consumption is defined via this media as 1, the little information consumption is defined via this media as 0. Set the probability of  $y=1$  as  $p$ , and the distribution function of  $y$  is:

$$f(y)=p^y(1-p)^{1-y}; y=0, 1 \quad (1)$$

In traditional regression model, the dependent variable range is between negative infinity and positive infinity, which is not applicable to this study. In this paper, the dependent variable is a dichotomous variable, the probability of

farmers' selection between regularity and irregularity via this media to information consumption depends on their characteristics. As the Probit model needs to evaluate the multivariate normal distribution as a whole, so its application is limited here, while the logical distribution is more suitable for the distribution choice in utility maximization. Therefore, this paper uses binomial Logit model, with the basic form as follows:

$$p_i = F(\alpha + \sum_{j=1}^m \beta_j X_{ij}) = 1 / [1 + \exp(-\alpha + \sum_{j=1}^m \beta_j X_{ij})] \quad (2)$$

In formula (2),  $p_i$  represents the probability of farmers' regular information consumption via this media,  $i$  is the farmer's serial number;  $\beta_j$  represents the regression coefficient of the influencing factor,  $j$  is the serial number of influencing factor;  $m$  means the number of factors

Variable category	Levels of analysis	Variable name	Variable definition	Mean	Standard deviation
Explained variables	Farmer	Television information consumption behavior	1=Yes; 0=No	0.80	0.39
		Network information consumption behavior	1=Yes; 0=No	0.26	0.44
	The personal characteristics of the farmer	Gender	1=male; 0=female	0.58	0.49
		Age	With the actual value (years)	43.4	9.07
		Level of education	0=Primary school and below 1=Junior high school 2=Secondary school or high school 3=College and above	0.94	0.88
		Party member or not	1=Yes; 0=No	0.39	0.49
		Per capita annual income	With the actual value (yuan)	442	0.6
	Family characteristics	The affordability of information risk	0=Cannot afford 1=Barely able to afford; 2=Able to afford	0.72	0.70
		Scale of operation	Total family cultivated area (mu)	3.98	0.69
	Agricultural production characteristics	Commercialization degree	0=Low; 1=Medium; 2=High	0.71	0.84
		Cooperative farmer or not	1=Yes; 0=No	0.26	0.44
		The situation of information services and facilities	1=Satisfied; 0=Not satisfied	0.82	0.68
		The degree of village cadres' intervention of information services	0=Less; 1=General; 2=Often	0.47	0.78
		Evaluation of information payment cost	0=Unreasonable; 1=General; 2=Reasonable	0.63	0.81
	Environmental characteristics	Information utility	0=Useless; 1=General; 2=Useful	0.36	0.64

Note: information services payment cost: training cost, network cost, paid agricultural information cost (including direct costs and use cost)

Table 1. Estimation Results of Model one and Model Two

affecting this probability;  $X_{ij}$  is the independent variable, representing the  $j^{\text{th}}$  influencing factors of  $i^{\text{th}}$  farmer, and  $\alpha$  represents regression intercept.

The mathematical expression of the empirical analysis model in this study is:

$$Y = F \left\{ \begin{array}{l} \text{sex, Age, Edu, leg, Income, Risk, Scal, Organize,} \\ \text{Facilities, Interfere, Cost, Utility} \end{array} \right\} + e_i \quad (3)$$

See table 1 for the definitions and explanations of various independent variables and the dependent variables.

### 3. Empirical Results Analysis

In this study, Eviews5.0 software has been used for regression analysis of the survey data. Seen from the regression results (see Table 1), the overall model simulation effect is favorable, basically consistent with the theoretical expectations.

According to the model run results, on the whole, there are great differences among factors affecting farmers' information consumptions via various information media. Factors affecting television information consumption behavior include: age, the party member or not and the commercialization degree; factors affecting network information consumption behavior include: age, annual per capita income, the scale of operation, the commercialization degree, information service facilities, cadres' intervention in information services, evaluation of information payment cost and information utility. It can be seen that there are few factors affecting farmers' information consumption via traditional information acquisition media, while a number of factors affecting their information consumption via modern network information acquisition media.

The specific impact of the four characteristics on farmers' information consumption is summarized as follows.

#### 3.1 Personal characteristics

It can be seen from model estimation results that the three factors, namely, age, educational level, party member or not have the most significant influence on farmers' information consumption behavior, whereas gender factor has little impact on farmers' information consumption. Specifically, personal characteristics have different levels of influence on different media information consumption behavior.

The influence of personal characteristics on television information consumption; age and party member or not have a significant positive effect on the probability of regular selection of television for information consumption, that is, the older the farmers' age is, the higher the probability of selecting television for agricultural information is. It is contrary to our expectations, mainly due to older farmers have more time to stay at home, and the agricultural

information acquired via the agricultural channel is easy to understand, fast and convenient, which is very popular among the elderly. Farmer party members tend to acquire agricultural information by watching TV on regular basis as expected. In rural areas, party members are capable, intelligent, have wider interpersonal relationship, and are good at capturing the agricultural information to take the lead of information consumption. In addition, the influence of education level is insignificant, mainly because television cater to all kinds of tastes farmers of different education levels can find their focus of attention.

The impact of personal characteristics on network information consumption; age is the main factor affecting farmers' acquisition of agricultural information via network, and the direction of age influence is negative as expected. The education level and being party members or not have little impact on network information consumption. Computer is an emerging rural information acquisition media, and the young people will give priority to purchase in the premise of having a certain economic strength. In contrast, the elderly has relatively backward thought and is little interested in learning, so it is difficult for them to accept the emerging information services such as computer. Few farmers are willing to try to use network media, while most of them are unable to operate a computer skillfully. In the survey of "digital home" of the administrative villages, internet is provided for free, but few farmers come to acquire or release agricultural information through network, and most of them are farmers aging from 20 to 40. For elderly farmers, even they have the need of information acquisition or release, most of them will ask village officials or young people who can use computer for help. Few of them can handle by themselves. Furthermore, the level of education has insignificant impact on the behavior of network information consumption. In fact, the impact of education level cannot be ignored. In the survey, farmers with the education level above high school are willing to search agricultural information via network. Survey results show that among farmers with the educational background above high school, 96 percent of them are willing to access to a variety of agricultural information via network, among them, 40 percent often search or release agricultural information through network, and 8 percent have the experience of consulting agricultural experts via network remote video.

It can be seen from Model Two, the impact of age on the consumption behavior of modern information media represented by network is negative, while it is positive on the consumption behavior of mass media represented by television. It is thus clear that younger farmers are prone to use the media of modern network information, while elder farmers prefer traditional information acquisition media.

#### 3.2 Family characteristics

The impact of annual per capita income on the internet information consumption behavior passed the test at a significant level of 5 percent, and the impact is positive.

	Variable	Model One Coefficient (z value)	Model Two Coefficient (z value)
Personal characteristics of the farmer	Gender	0.1219 (0.3772 )	0.0022 (0.0029)
	Age	0.0457 * * * (2.4432)	-0.1049 * * (-2.0590)
	Level of education	0.2240 (0.9172)	0.09420 (0.1747)
	Party member or not	0.5837 * (1.6468)	-0.0509 (-0.0620)
Family characteristics	Annual per capita income	0.1915 (0.7945)	0.2017 * * (2.3782)
	Information risk bearing capacity	0.2574 (1.0351)	0.4258 (0.7490)
Production characteristics	Business scale	-0.0001 (-0.0004)	0.8343 * (1.6200)
	Degree of commercialization	-0.5160 * (-1.6690)	0.8891 * (1.6020)
	Whether being cooperative farmers or not	-0.6571 (-1.3577)	0.6294 (0.5406)
	Information service facilities status	-0.2920 (-1.2232)	0.9933 * (1.5579)
Environment characteristics	Cadres' intervention on information services	0.1355 (0.3995)	0.89119 * (1.44579)
	Evaluation on information payment cost	0.1249 (0.4441)	1.2387 * * (2.0676)
	Information utility	-0.1849 (-0.4305)	2.5520 * * * (2.5151)
	Constant	-0.4983 (-0.5490)	-11.5099 (-3.5623)
Number of samples		305	305
LR statistic		26.4888	282.5802

Note: \*, \*\* and \*\*\* represent the significant variables on the level of 10 percent, 5 percent and percent respectively

Table 2. Estimation Results of Model One and Model Two

However, this indicator failed to pass the test of the impact on the behavior of television information consumption. This is because most of the information provided by network is paid information, when the cost of information consumption exceeds the disposable income level of these rational small-scale farmers, information consumption is bound to reduce. However, the information provided by television is mostly public service, and farmers do not need to pay or just pay a little amount. Therefore, the information consumption has little relationship with the per capita income, which is basically consistent with our expectations. We also found in the survey that when the farmers' per capita net income exceed 5000 yuan, their consumption behavior begins to change, that is, the consumption of luxury goods increases, so they will increase to purchase consumer goods such as the network.

The failure of the impact of information risk bearing capacity

on the consumption behavior of television and network information in the test indicated the insignificance.

### 3.3 Production characteristics

There are great differences of the impact of production characteristics on various media information consumptions. In general, the scale of operation has significant impact on network information consumption, whereas the commercialization degree has great impact on television and network information consumption.

Specifically, the impact of commercialization on television information consumption is negative, contrary to the expected direction, indicating that higher commercialization degree leads to less probability of farmers' selection of television as information consumption. Operation scale and whether the cooperatives farmers or not failed to pass inspection, but the direction is negative, contrary to the expectation.

The scale of operation and degree commercialization has obvious positive impact on network information consumption behavior, indicating that the higher the degree of operation scale and commercialization is, the farmers will be more prone to use network for the acquisition of agricultural information, which is completely consistent with the expected results. On the contrary, the impact of organization degree on network information consumption is not significant, but its impact direction is positive, also the same as the expected results.

### 3.4 Environmental characteristics

The four variables of environmental characteristics have no significant impact on television information consumption, while have great impact on network information consumption, indicating environmental characteristics are not the main factors affecting farmers' utilization of traditional information acquisition media, but are the main reasons affecting their utilization of modern network information media. Moreover, in the environmental characteristic variables, information utility has significant impact on network information consumption while insignificant impact on television, showing a clearer purpose of farmers' utilization of modern network information media on information consumption, that is, to gain profits by information utilization, while their information consumption via traditional information is lack of purpose. The specific analysis of the impact of environmental characteristics on different information media is as follows:

The impact of information services infrastructure and information utility on television information consumption failed to pass the test, but has negative impact, contrary to the expected direction. The reason is that the better the information service infrastructure is, the farmers are more motivated to seek information acquisition media, and reduce television information consumption. Moreover, farmers believe the agricultural information acquired from the television has low utility, low information specific reference and plays a limited guiding role on agricultural production. The impact of cadres' intervention in information service and the evaluation of information payment cost on television information consumption also failed to pass the test, but has positive impact. The higher the degree of cadres' intervention of information services is, the more reasonable the information cost is, and the more advantageous to television information consumption, which is the same as the expected direction.

The four variables, namely, the status of information service facilities, the cadres' intervention in information service, the evaluation of information payment cost and the information utility have a significant positive impact, which is entirely consistent with theoretical expectations, indicating that environmental factors play an inducing role in the modern information consumption media represented by network. Environmental factors include information

using environment and information environment. Information using environment includes the status of information infrastructure and the cadres' intervention in information use, whereas information environment includes information cost and utility. In the administrative village of the survey, 100% of village committees have been installed the network, and provided free internet access under the guidance of village cadres. However, farmers have different evaluations on the cost of information service payment. The cost includes equipment purchase cost, network using cost and paid agricultural information cost (including direct cost and indirect cost). Information utilization cost is still a major obstacle of farmers' information consumption. In addition, the lag nature of information generated utility, coupled with farmers' limited information screening capacity, make information utility difficult to measure, which also constitute a barrier to farmers' information consumption.

## 4. Conclusion

Multi-Logit model has been used in this paper to research the affecting factors of farmers' network information consumption. The research conclusions are as follows: (1) there are few affecting factors of farmers' information consumption via traditional information acquisition media, but are a number of affecting factors of their information consumption via modern network information media; (2) environmental characteristics are not the major factors affecting farmers' utilization of traditional information acquisition media for information consumption, but mainly affect their utilization of modern network information media for information consumption; (3) Younger farmers more often use modern network information media, whereas older farmers are more prone to use traditional information acquisition media; (4) farmers have a clearer purpose in the utilization of modern network information media for information consumption, that is, to gain profits by information utilization, while their information consumption via traditional information is lack of purpose.

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## Author Biographies



Hailiang Meng was born on August 1974 in Hebei, China. He is a lecturer with Economics & Management Institution, Beijing Information Science & Technology University since September 2009. He received his Ph.D degree in Management Science from Beihang University (June 2007). His main research interests include broad areas of Economics of Information, Financial Engineering.



Xinquan Ge was born on March 1957 in Anhui, China. He is a professor with Economics & Management Institution, Beijing Information Science & Technology University. He is the Dean of Economics & Management Institution, Beijing Information Science & Technology University and the chief expert of the Beijing knowledge management research base. His main research interests include broad areas of Economics, statistics and management science.



Mingxia Xie was born on October 1978 in Hebei, China. She is a lecturer with Beijing Textile Holding Company, LTD since July 2010. She received her Ph.D degree in Management Science from China Agricultural University (June 2010). She main research interests include broad areas of economics of information, scientific and technological innovation.