

The Characteristics of Farmers and Paying Willingness for Information

—Empirical Study Based on 120 Farmers in Qingbaijiang District, Sichuan

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Abstract

In the knowledge-based economy, information, information cost and information benefit that farmers acquire are bound to influence their decision making. This study is based on 120 questionnaires from 9 towns (including 38 villages) of Qingbaijiang district, Sichuan Province. The study examines the compact of the characteristics of the farmers on the paying willingness for information. The findings show that the paying willingness of the farmers are affected by education, age, per-income, the proportion of agricultural income, bearing ability to information risk, action, satisfaction degree, and the proportion of household labor. The relationship between paying willingness and these factors (not include satisfaction degree) is positive. In addition, authors suggest that farmers' awareness and level of demand, as well as ability of applying information to agricultural production, should be improved, and farmer-oriented mode of diversified information services might be formed.

Keywords: Characteristics of farmer, Paying willingness, Logistic model, Empirical study

1. Introduction

The issues about agriculture, rural and farmers are very important to reform and opening up, to modernization construction in China. With the deepening application of information technology, agricultural informatization is playing a more and more important role in rural economic and social development.

As the views of information economics, information is a key element: the first is that information would penetrate into production material (including labor object and material) through the materialization; the second is that information can contribute to rapidly increase productivity through the humanizing; the third is that more and more transactions is reliable to information. However, it is in all actions that the cost would happen. The expenditures for information have been becoming a part of total production cost. Information costs have the different impact on the different farmers, and different farmers have the different paying willingness.

2. Literature Review

Information is a kind of key recourse in information era. The value of information lies in its ability to affect a behavior, decision, or outcome. Information is an essential ingredient in agricultural development programs (Ozowa, 1995). Information need is one of the farmer's needs. Ozowa (1995) argued that the information needs may be grouped into five headings: agricultural inputs, extension education, agricultural technology, agricultural credit, and marketing. Each of them is useful for farmers. But the different characteristics farmers have the different needs and choose. As Sabo Elizabeth (2007) described that “the women farmers required information on weather, soil management, credit availability, and farm management, besides awareness on improved seedlings, fertilizer and insecticides, animal health, future market prices, land tenure, child immunization, and

vaccination for animals". Similarly, Ogunlade (2007) analyzed information needs of backyard fish farmers in Osun State, Nigeria, and investigated the socio-economic characteristics of backyard fish farmers, frequency of performance, importance and difficulties of management practices as well as the constraints facing backyard fish farming.

Information cost is an economic concept. Study on information cost abroad can be traced back to the 20th century 30s, and Ronald H. Coase published the classic paper in 1937, which is "The Nature of the Firm". Subsequently, with the emergence and development of information economics, more and more researchers have studied information cost. For example, Kenneth J. Arrow, George Joseph Stigler, Mark Casson had studied cost information from different perspectives. Overseas, information costs have been studied more. In addition to the above, there are some following issues, such as information cost and innovation (Richard Jensen, 1988), information cost and insurance (Chu-shiu Li, 2000), information cost and decision-making (Robert T. Whitely Jr, William A. Watts, 1983), information cost and system features (Gordon Byce, 1999), information cost on the impact of immigration (James B. Kau and C F. Sirmar, 1977).

In recent years, domestic academic gave more attention to the farmers' information demand. For example, Zheng Yegang (1999) thought small-scale land operation and low comparative effectiveness of agricultural production affected the farmers' initiative on the information demands. Wang Xiaolan (1999) argued that, because of economic conditions, cultural quality and other infrastructure constraints, the farmers' abilities of accepting, adapting and using the information are low, and they are difficult to accept paid technical information services. Xu Shiming (2001) considered the main factors affecting information consciousness of personal are the followings: cultural qualities, the local infrastructure, information market and information services. Ma Shaiping (2006) considered too high information search cost, the agricultural information market imperfections, the low quality of rural farmers are the major reasons why information needs of farmers face difficulties. Zhang Jinjie (2007) analyzed the accounting of information cost which happened in the production process. Zhong Xingkang (2009) integrated the basic ideas of management accounting measurement and financial accounting measurement, and discussed measuring properties, measuring structure and measuring pattern of management information cost.

The studies on information costs at domestic and abroad are the following characteristics. Firstly, the research fields belong to information economics; secondly, normative study is the main methodology; thirdly, the impact of information cost is the issue; the fourth is that information cost studies come from multi-perspectives, such as system perspective, technical perspective, commodity perspective, transaction perspective and management perspective.

3. Methodology

3.1 Research Method

This data in the study is from the grass-roots farmers' questionnaire. The findings could explain the farmers' information needs in agricultural production process and farmers' willingness to pay for information costs in agricultural production. In the paper, the theory research and empirical research are integrated, and qualitative analysis and quantitative analysis are combined.

3.2 Hypothesis Development

The discussions that farmers behaviors is or isn't rational have been consist in economics field. Rational small farmer school, such as T. W. Schultz, viewed that the small-scale farmer might effectively arrange their disposal resources, and they are the people who go for the most benefit and make reasonable decisions after thinking about the long and short term interest, and are "rational small farmer". The farmer's ration means when he was faced with several alternative proposals; he would choose the scheme that can bring the utility maximization for him or his family.

In market economy, the farmers are rational agents, and whether the farmers are willing to pay for the information or not is a rational selection result after they compared the income with the cost; the effect and the value of the agricultural information are the foundations of the farmers' decision-making. In the paper, the authors assume e_0 is the current income of the farmer engaging in agricultural production, e_1 is the future income of the farmer who have paid for information, c is the cost that the farmer pays for information, which consist of information price, transport expense, calling bill, electricity expense, service charge and repairing expense, and so on, oc is the opportunity cost of the farmer paying for information. The formula of agricultural information effect and value (V) is:

$$V = (e_1 - c - oc) - e_0 \quad (1)$$

where $V = 0$ means the balance of the profit and loss of farmer's information investment. When $V > 0$, which

means the future net income (Input minus cost for the farmer's information investment) is more than the current income, the farmer would make investment decision. Based on the theory analysis, the decision-making pattern of the agricultural information investment can be summed up:

$$\text{Pay or not pay} = \begin{cases} \text{yes, if } V > 0 \\ \text{not, if } V \leq 0 \end{cases} \quad (2)$$

In the formula (1), the agricultural information cost (c) and the current agricultural production incomes (e_0) are easier to identify, but the future incomes (e_1) and the opportunity cost (oc) are decided by farmers and external environmental factors.

Based on the research result and rational farmer assumption, and relevant data, there are the following hypothesis: *the main factors that influence the farmers' paying willingness for information include personal characteristics, family characteristics, and information need characteristics for agricultural production, agricultural production characteristics and the acquiring information channel characteristics.* The details are as follow:

(1) Personal characteristics: including the education and the age of the head of the household. Theoretically, ① the correlation of the educational background and paying willingness is positive, so the head who is higher cultural level has stronger willingness to pay for agricultural information; ② the correlation of the age and paying willingness is negative, so the younger farmer has stronger willingness to pay for agricultural information.

(2) Family characteristics: consisting of per-income, the proportion of agricultural income to total income and the bearing ability to agricultural information risk. Theoretically, ① the correlation of per-income and paying willingness is positive, so per-income of a household is lower, the willingness to pay for agricultural information is stronger; the correlation of the proportion of agricultural income to total income and paying willingness is positive, so the proportion is lower, the willingness to pay for agricultural information is weaker; ② the bearing ability of agricultural information risk and paying willingness is positive correlation, so the bearing ability is weaker, the willingness to pay for agricultural information is weaker too.

(3) Information needs characteristics of farmer's agricultural production: This might be described with the satisfaction degree of farmers' information needs and the farmer's action. ① The relationship between the satisfaction degree and paying willingness is negative, when the farmer dissatisfy more with the amount of information, the paying willingness is stronger; ② the correlation between the initiative of farmers searching information and paying willingness is positive. So the stronger the initiative is, the stronger the willingness to pay is.

(4) The farmer's agricultural production characteristics: those include the proportion of farm labor force to the total persons in household and total land area of family, and both of them could better reflect the farmers' agricultural production scale and levels. Generally, the relationship between the variables and paying willingness is positive.

(5) The farmer's acquiring information channel characteristics: those are personnel channels, media channels and organizations channels. Personnel channels include the neighbors and friends, big producer, distributors and the family members employing outside; media channels include traditional media, such as television, radio, newspapers, magazines, bulletins, and also include modern media, such as internet and mobile phones; organization channels consist of the government institutions, (agricultural)business and professional associations. All of them reflect information dissemination at a certain extent. In general, the relationship between the difficulty level of farmer access to agricultural information and paying willingness is positive.

3.3 The Empirical Model and Variables

Logistic regression model is the effective tool used to study the relation of qualitative variable and their influence factors. In order to inspect the influence of the farmer characteristics to paying willingness and to assert the influence degree and significant gender, this paper establish the binary choose model for paying willingness with 101 samples.

Building on the hypothesis, the model refers to the following variables (table 1).

The paying willingness is dependent variable. If the farmer is willing to pay for information, $y=1$; if the farmer is not willing to pay, $y=0$. Set p as the probability of $y=1$, the distribution function as follow:

$$f(y) = p^y (1 - p)^{(1-y)}; y = 0, 1 \quad (3)$$

In the paper, the dependent variable is dichotomous variable; the probability of farmer's paying willingness is decided by the farmer's characteristics, and the relationship between them to obey the logistic function. So, there is the binomial logistic model as follow:

$$P_i = F\left(\alpha + \sum_{j=1}^m \beta_j x_{ij}\right) = 1 / \left[1 + \exp\left(-\alpha + \sum_{j=1}^m \beta_j x_{ij}\right) \right] \quad (4)$$

where p_i is the probability of farmer's paying willingness, i is serial number of the farmer; β_j is regression coefficients of the factors, j is the serial number of the factors; m is the number of the factors; X_{ij} is the independent variable, which is the j factors of the samples of the farmer I ; α is the intercept.

4. The Sample and Descriptive Statistics

4.1 The Sample

According to the research issues, this study investigated the different characteristics farmers with questionnaire and structural interview, and the samples come from a random sampling method.

The questionnaires were issued total 120, in which 116 samples were collected back, and the effective samples are 101, which is 84.2% effective questionnaire. The survey team investigated 9 towns and 40 villages in Qingbaijiang District, Sichuan, which basic covers various developments villages, and is more representative. The investigated areas and the sample distribution are as follow (table 2).

4.2 Descriptive Statistics

4.2.1 The Farmers and the Households

In this survey, most of the interviewees are male, which is 73.3% of the investigation samples. In the interviewees, the percents of different age structure are 0.99% below 19, 23.76% between 20 and 29, 24.75% between 30 and 44, 29.70% between 45 and 54, and 20.79% over 55. Most of younger farmers have gone out for work. The middle age people and the aged people are staying in rural and are main force engaging in agricultural production.

In the interviewees, the illiteracy is 12.87%, the primary is 25.74%, the junior is 34.65%, and the high is 15.84%, the vocational is only 2.97%, above the specialty 7.92%. In all, the farmer's education is less. The farmer's education affects directly the farmer's opinion, and influences the farmer's ability to dominate the cost of production information.

In the samples, average population is 4.01, and average labors are 3.05, including 2.4 agricultural labors in per-family. The average cultivated land is 0.043 ha in per-family (Table 3).

4.2.2 The Production and Operating Types

From the survey, 45.59% of interviewees are side-work farmers, who engage in both agricultural production and non-agricultural production; 45.54% of interviewees are self-sufficient farmers, who mainly engage in traditional agricultural production, especially grain production, to consummate for his family and not to involve in agricultural products market; 12.87% of interviewees are the professional plant (raise) farmers, who not only plant grain, but also plant vegetable and raise poultry. Most of agricultural productions are sailed in market, and only little of them are consummated by family. (Table 4)

4.2.3 Family Income and the Bearing Ability to Information Risk

After researching the service order of agricultural information, professor Li Daoliang (2006) from China Agricultural University divided the family income into three groups: the first is below 8000 Yuan (low income family), the second is 8000~12000 Yuan (medium income family), the third is above 12000 Yuan (high income family). Reference to such standard, 58.42% of interviewees belong to high income family, only 15.84% of interviewees are low income family, which reflect the better economic situation in Qingbaijing District.

And through statistical analysis, in 2008, the scale of interviews, whose proportion of agricultural income to total income is above 50%, is 56.44% in samples in 2008 (Figure 1).

In a way, the result of farmer using information relate to total income, investing effect and economic risk. So the bearing ability to information risk of farmers must be taken into account. If the bearing ability is less, farmer's initiative is lower, which should influence investing plan. In this survey, when we asked if the interviewees could bear the information risk, 91.9% of them answer no, which indicate the ability is still weaker. In addition, table 5 shows that income levels of farmers is different, and the ability is different: with the growth of the family income,

the bearing ability to information risk would be improve.

4.2.4 The Paying Willingness for Agricultural Information

From the survey, 72.3% of interviewees are willing to pay for agricultural information, and a few farmers' paying willingness is not strong. Most of farmers are willing to pay for production technology information, production material information and national politics information, which respectively is 57.14%, 79.59% and 93.75% of interviewees. Because they think these information are very important to improve productive skills and to increase farmers' income, and they believe national politics information avail the farmers themselves. The proportion of farmers who are willing to pay for supply & demand information is 43.75%.

5. Definition of Variables and Statistical Description (Table 6)

6. Empirical Results

EvIEWS3.1 is used for investigation data regression processing in the study. From the regression results (table 7); the model whole fitting effect is good, and the result is consistent to the theory. According to the model result, this paper summarized as follows:

(1) In Personal characteristics, education degree variable in 1% level is significant, and the coefficient is positive. It shows the farmer who is higher education is more willing to pay for agricultural information under other invariant variables. Higher education helps the farmer to identify and grasp the earning chance and to decrease the economic cost for collecting and using information. The age variable is non-significant, which don't conform to the hypothesis.

(2) In family characteristics, those variables in 10% level are significant, and the coefficients are positive. It shows: (I) The family per income is higher and relative cost of information investment is smaller, so their paying willingness is stronger; (II) In the family, the farmers, whose proportion of agriculture income is higher, have the strong willingness to pay for agricultural information; (III) the bearing ability to information risk is the main factor affecting farmers' paying willingness, and the ability is lower, the enthusiasm of using information is less, which restrict the willingness of the farmers' investment information.

(3) In agricultural production characteristics: (I) the satisfaction degree of farmers' information demand is the main factor affecting paying willingness. The satisfaction degree variable is significant in 10% level and the coefficient is positive. (II) when the farmer has information demand, the action variable also affects the paying willingness, it is significant in 1% level, and the coefficient is positive. It shows if the farmers having the information needs search information initiatively, the paying willingness will be stronger.

(4) In agricultural production characteristics, the results show: (I) total land area variable is non-significant; (II) the proportion of farm labor variable is significant in 1% level, and the coefficient is positive. The proportion is higher and the paying willingness is stronger.

(5) In information channel characteristics, these variables are significant in 10% level, and all the coefficients are positive. More personnel channels contribute to collecting more agricultural information. But the weakness is information effectiveness for personnel's quality, which view is same to Wang Dehai's viewpoint (2009).

Media channels, such as TV, broadcasts, news papers, magazines and bulletin boards, are very important to collect agricultural information and to get the information service timely. From organization channels, the peasants could obtain reliable and accurate information.

7. Conclusions and Suggestions

7.1 Conclusions

This research shows the paying willingness of the farmers are affected by the education, the age, the per-income, the proportion of agricultural income, the bearing ability to information risk, the action, the satisfaction degree, and the proportion of farm labor. The influence of these factors is positive besides the satisfaction degree.

(I) Because of information asymmetry and information cost, the action of farmers are affected by the time and the expense for information. If the time are more and the expense is higher, information cost is bigger, and the paying willingness is less.

(II) When the farmers own enough information, the buying willingness for information would be weaker, that is the satisfaction degree is higher, and rate of return would decrease. This conclusion is similar to Zhuzheng's viewpoint: when the amount of information gets a certain extent, the marginal benefit will be less information marginal cost.

7.2 Suggestions

From the findings, information cost is an important factor affecting farmer's making-decision. How to decrease information cost and to improve information effect? In the paper, the suggestions are given as follow:

- (1) To improve the management functions, strengthening education and improving the transparency of the market.
- (2) To increase investment in education and technical training, to improve farmers' information consciousness and ability of using information, and to perfect the communication with the external conditions.
- (3) To stimulate peasant's information needs, to improve the rural science and technology environment, ensuring the quality information. The countermeasures are (I) to build information service station, (II) to construct information service team, and (III) to perfect rural cable TV network.
- (4) To establish and perfect supervision mechanism of agricultural information, information laws and regulations; to establish agriculture risk compensation fund, which may improve agricultural information risk safeguard mechanism and strengthen the farmer bearing ability of agricultural information risk.
- (5) To construct the ally of both enterprises and Medias and to set up information industry chain, which are helpful to produce competitive information?
- (6) In the higher level regions of economic development, information service commercialization might be realized gradually by the farmer's bearing ability. In relative backward regions of economy development, the government should offer public information services model, and provide free agricultural information to farmers, and the information is strong public and no obvious economic benefit.

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Table 1. Farmer's characteristics and variables

farmer's characteristics	The variables
(1) Personal characteristics	education level(Education) farmer's age(Age)
(2) Family characteristics	per-family income(Income) the proportion of agricultural income to total income (Farming Income) the bearing ability of agricultural information risk (Risk)
(3)Agricultural production information needs characteristics	the farmer's conduct(Action) the satisfaction degree of Farmers' information demand(Satisfy)
(4)Agricultural production characteristics	the proportion of farm labor force to total (Labor) total land area of family (Land)
(5) Information channel characteristics	personnel channels(Manpower) media channels(Media) organizations channels(Organizations)

Table 2. The investigated areas and the sample distribution

Town	Village	Number of Farmers
Long Wang town	Qingguang, Hongshu, Liangshu, Hongsha, Shanfang, Shuanglian et al.	15
Da Tong town	Qinglong, Shanfang et al.	15
Qin Quan town	Jinalong et al.	12
Fu Hong town	Minzu et al.	11
Yao Du town	Guangming, Yonghe, Huangli et al.	17
Xiang Fu town	Fulong, Qinglong et al.	20
Huang Tu town	Xinggong, Hongan, Changliang et al.	10
Fu Xing town	Qingtong, Fuan et al.	10
Guang Chang town	Baimaquan, Qidaogou et al.	10
Total		120

Table 3. The population, labor and cultivated land

The town	The population (person)	The labor (person)	The agricultural labor (person)	The average cultivated land(ha)
Long Wang town	3.90	2.90	2.20	0.039
Da Tong town	4.70	3.60	2.90	0.049
Qin Quan town	3.23	2.62	1.92	0.057
Fu Hong town	3.64	2.82	1.91	0.060
Yao Du town	2.80	2.30	2.00	0.033
Xiang Fu town	5.29	4.00	3.41	0.032
Huang Tu town	4.00	3.10	2.60	0.031
Fu Xing town	4.10	3.20	2.10	0.042
Guang Chang town	3.80	2.40	2.00	0.055
The Average	4.01	3.05	2.40	0.043

Table 4. The production and operating types unit: %

Type	Long Wang town	Da Dong town	Qing Quan town	Fu Hong town	Yao Du town	Xiang Fu town	Huang Tu town	Fu Xing town	Guang Chang town	Average
Self-sufficient farmers	40.00	70.00	23.08	54.55	45.45	47.06	30.00	30.00	87.50	45.54
Professional plant(raise) farmers	0.00	0.00	15.38	0.00	0.00	35.29	40.00	0.00	12.50	12.87
Side-work farmers	60.00	30.00	61.54	45.45	54.55	17.65	30.00	70.00	0.00	40.59

Table 5. The bearing ability to information risk in different level family

The ability	Low income family (%)	Medium income family (%)	High income family (%)
Strong	12.5	11.54	22.03
Medium	68.75	76.92	72.89
Weak	18.75	11.54	5.08

Table 6. Definition of variables and statistical description

variables		Definition of variables	Average	Paying willingness	No paying willingness
Personal characteristics	education(Education)	0=illiteracy; 1=primary; 2 =junior; 3= senior; 4=vocational; 5=specialty	1.94	1.95	1.93
	age(Age)	0=below 19; 1=20 to 29; 2=30 to 40; 3=45 to 54; 4=above 55	2.46	2.42	2.54
Family characteristics	per-income(Income)	per farmers' income (Yuan)	1.80	1.97	1.36
	the proportion of agricultural income to total income (Farming Income)	(%)	53.97	52.75	57.14
	the bearing ability of agricultural information risk (Risk)	0 =strong; 1 =medium; 2 =weak	1.09	1.10	1.07
agricultural production information demand characteristics	the farmer's conduct (Action)	0=abandon; 1=accept; 2= not care; 3= actively searching	1.41	1.64	0.79
	the satisfaction degree of farmers' information demand(Satisfy)	0= Can't satisfy; 1= satisfy; 2=Fully satisfy	0.70	0.81	0.43
agricultural production characteristics	the proportion of farm labor to all (Labor)	(%)	60.98	61.48	59.70
	total land area of family (Land)	(ha)	0.173	0.159	0.209
information channel characteristics	personnel channels(Manpower)	0=no; 1=yes	0.84	0.90	0.68
	media channels(Media)	0=no; 1=yes	0.83	0.84	0.82
	organizations channels(Organizations)	0=no; 1=yes	0.54	0.63	0.32
Dependent Variables	paying willingness(y)	0=no; 1=yes	0.72		

Data resource: the survey in 2009

Table 7. Regression results

Variable	Coefficient	Std. Error	z-Statistic	Prob.
X1(Education)	0.071022***	0.299467	0.237160	0.8125
X2(Age)	0.197889	0.360788	0.548491	0.5834
X3(Income)	0.459741*	0.311054	1.478012	0.1394
X4(Farming Income)	0.001917*	0.009948	0.192746	0.8472
X5(Risk)	0.091364*	0.544686	0.167737	0.8668
X6(Action)	0.279320***	0.283052	0.986816	0.3237
X7(Satisfy)	-0.407454*	0.453885	-0.897702	0.3693
X8(Labor)	0.002513***	0.012103	0.207634	0.8355
X9(Land)	0.558810	0.240945	2.319242	0.0204
X10(Manpower)	1.458018*	0.716541	2.034802	0.0419
X11(Media)	0.016786*	0.712239	0.023567	0.9812
X12(Organizations)	0.588802*	0.594449	0.990501	0.3219
C	-1.016487	1.970431	-0.515870	0.6059

Notes: LR statistic=27.51390; *p<0.1; ** p<0.05; *** p<0.01

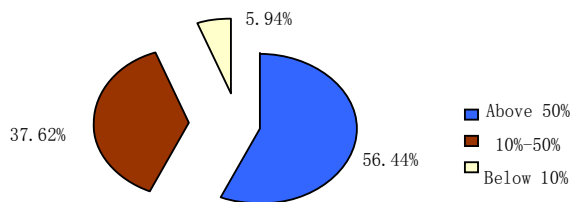


Figure 1. The proportion of agricultural income to total income