

Member Investment Willingness in Agricultural Cooperatives in Shaanxi (China)

Lijia Wang and Xuexi Huo

Abstract—This study analyzes characteristics determining member's willingness to invest in cooperatives using ordered logit model. The data were collected in a field survey among 122 cooperative members in north-central China. The descriptive analysis of survey evidence suggests that cooperatives in China generally having poor ability to deliver the processing services related to product package, grading, and storage, performing worse in profitability, inability of providing returns to capital and obtaining agricultural loan. The regression results demonstrate that members' farm size, their satisfaction with cooperative price preferential services, attitudes toward cooperative operational scale and development potential have statistically significant impact on willingness to invest.

Keywords—Cooperatives, investment willingness, member, ordered logit.

I. INTRODUCTION

THE unique character of cooperatives rests in the relationship of user, ownership, and controlling interests [1]. According to the relationship, cooperatives can be categorized into the user-owner, the user-control, and the user-benefits ones [2]. On the whole, cooperatives can be helpful to foster agricultural development, to internalize the transaction cost, and consequently to realize the increase of farm households incomes and the improvement of their living condition [3], [4].

In recent decades, as the increasing highlighted position of cooperatives in the rural development, a number of researchers started to focus on the study of the investment incentives, the performance evaluation of cooperatives [5], [6]. Reference [7] present that producer's investment level is the basis of delivery rights of commodities. Capital acquisition in cooperatives is been viewed as a problem of opportunistic behavior related to free rider. This results in no incentive of members to invest in cooperatives although the investment is critical to the success of cooperatives [8]. Reference [9] strongly promote that earnings retained for investment must eventually be returned to the members, only in this way can make the cooperatives continue operate.

Regarding to the study of the investment willingness, several literatures cover the economic and social factors influencing the investment behavior. Some researchers find

that the level of farm income was a significant influent, that is, producer relying much more on farm incomes has higher probability to invest in cooperatives than those depending less on farm income [10]. Others report the distance between residence and cooperatives, member's fund as important factors affecting their desire to invest in cooperative [11]. Some scholars state that non-monetary benefits from investment including familiarity with cooperatives and the time spending on farm work are dominant factors influencing member's investment decisions [12]. Others promote loan officers believe that cooperative investment is riskier than alternative investment in stock, certificates of deposit, and other farm enterprises [13]. Thus, this indicates that cooperatives are hard to obtain capital or fund from local or central financial organizations.

China has been the world's largest fresh apple producer since 2006. The fresh apple production in China increased from 26.05 million tons in 2006 to 33.70 million tons in 2012 (USDA-ERS, China Agriculture Research System). The share of fresh apple production volume reached 57.26% in 2012, followed by the EU (20.1%) and the U.S. (7.17%) (see Fig. 1). There are two major apple production regions in China: 1) Bohai Bay in the northeastern China; 2) the Loess Plateau in north-central China. The speedy increasing of apple production in China partly attributed to the rapid expansion of apple orchard in Shandong and Shaanxi province [14], and the progress of productivity technologies [15]. In 2012, fresh apple production in Shaanxi province was up to 9.0 million tons, accounting for 27.0% of the total in China (Fig. 2). Since it is the biggest apple producer in China, the case study of apple production cooperatives in Shaanxi province can be representative of the situation in central-western China.

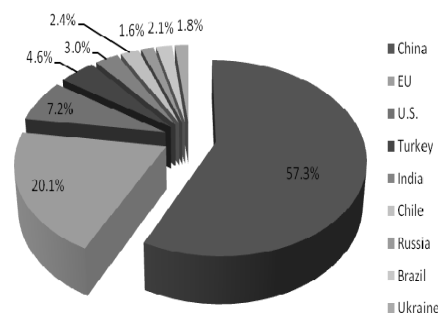


Fig. 1 The share of major fresh apple producer in the world

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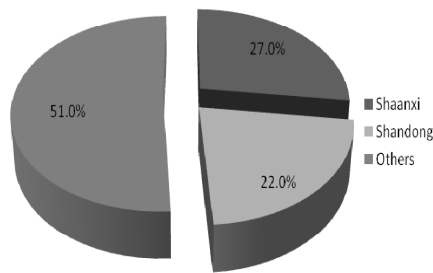


Fig. 2 The share of major fresh apple production provinces in China

The dominant purpose of agricultural cooperatives is to enhance the development of small-scale farmers and other communities [16]. There has been a rapidly development of cooperatives in China since the implementation of the Law on Agricultural Cooperatives of People's Republic of China (hereafter called *the Law*) in 2007. It is reported that the number of the registered cooperatives in China reached to 689 thousand by the end of 2012 (State Administration for Industry & Commerce of the People's Republic of China). Differ from agribusiness firms, the objectives of cooperatives operation in China are to provide services to benefit their members rather than earning profit. The key function of cooperatives is to provide services like technique dissemination, market information, standard management, discount on farm inputs purchases, etc (*the Law*).

On the other side, the fast growth is accompanied by several negative issues, i.e., the inefficient operations, weak competitiveness with other agribusiness firms [3], lack of specialized management staff, as well as the inability of continued development. According to *the Law* in 2007, the major initial capital sources for the establishment of cooperatives are member's investment and the agricultural fund from local or central government. As the government financial support is reduced or limited by the agricultural policies, the investment from members becomes the important capital source for the continued development of cooperatives. Thus, the study on the impact factors of member's investment willingness has practical implications to the sustainable development of cooperatives.

Overall, the basic purpose of this paper is to discuss the factors that affect a member's willingness to invest in the cooperative. The next section elaborates the sampling procedure, theoretical framework and the methodology. After that we present descriptive results on member demographics, farm characteristics, satisfaction with various cooperative services, evaluation on cooperative finance-based ability and the competitive capability. This is followed by a section presenting the regression results of ordered logit model. Concluding remarks and implications are given in the final section.

II. ANALYTICAL FRAMEWORK AND METHODOLOGY

The field survey was conducted during July-August 2011, 130 questionnaires of cooperatives members from six apple-based counties in Shaanxi province were collected. Note that

apple-based county is an agricultural specialization region on the basis of social division of labor. It is an outcome of spatial agglomeration of agricultural industry. This specialization region primarily deal with apple farm, in other words, it takes apple farm as the specialization direction of agricultural region, and is an open economic system which has a clear regional boundary and a certain of regional scale. There are 30 apple-based counties in China (Shaanxi Statistics Yearbook). Among the 130 samples, eight samples were omitted due to the limitation of member's memory and incompleteness of the questionnaire. The sample efficient rate was 93.85%.

According to the aim of the article, the questionnaire primarily includes four modules: 1) member demographics and farm characteristics referring to age, academic educational attainment, off-farm experiences, on-farm years, farm size, etc. 2) cost and benefit information associating with cost of farm inputs and family incomes; 3) attitudes toward various cooperative services; 4) evaluation on indicators of cooperatives operation including finance-based ability and competitive capability. The detail descriptive results comprising the four modules (see Table I) are discussed in the next section. The descriptions and hypothesized coefficient signs of investment willingness variables employed in the ordered logit analysis are also presented in Table I.

A. Analytical Framework

An amount of the preceding researchers are focus on the study of cooperatives performance evaluation by using various predictors, such as profitability, liquidity, leverage, asset efficiency, institutional and governance factors [17], [18]. Besides, attitudinal variables are significant explanatory factors to individual's willingness-to-pay [19].

On the basis of preceding studies and considering the objective of this research, an investment willingness analytical framework is promoted (Fig. 3). Five modules are included: 1) member's demographics and farm characteristics; 2) satisfaction with various cooperative services grouping into technique dissemination, price preferential, and product processing; 3) evaluation on cooperatives finance-based ability; 4) evaluation on cooperatives competitive capability; 5) degree of trust in cooperatives.

The service ability of cooperatives is divided into threefold: 1) technique dissemination which is the average evaluation value of training and market information provision, disease and insect control, and the standard management of orchard; 2) price preferential which is estimated by the average evaluation value of discount on agricultural inputs purchase and the higher purchasing price of cooperatives than market price; 3) processing services which is also measured by the average evaluation value of services related to product package, grading and storage. Note that in the sample areas, apples are usually categorized into three grades based on the apple fruit size, shape and quality. Apples with higher quality and bigger size would sell in greater price than apples with smaller size. The finance-based ability is evaluated by indicators of returns to capital, obtainment of agricultural loan from local or central government, and the profitability of cooperatives. The

competitive capability of cooperatives is valued by three predictors including cooperative operational scale, reputation in local area, and the development potential.

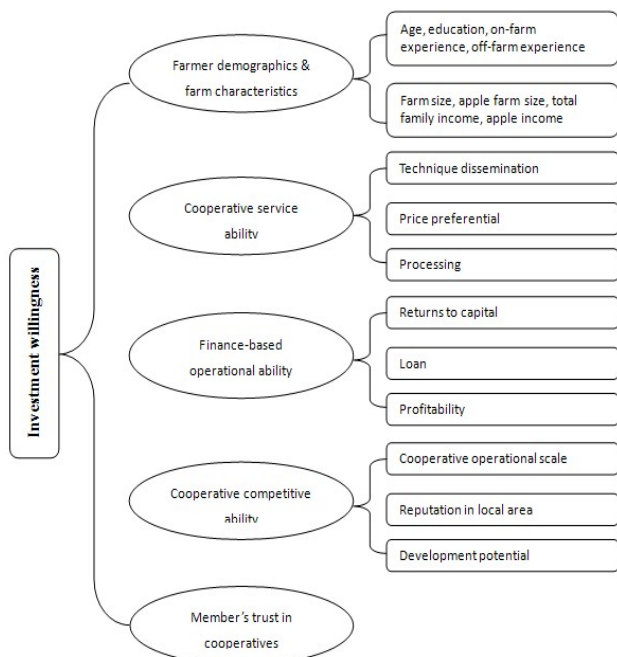


Fig. 3 Analytical framework of member's investment willingness

B. Methodology

A five-point Likert scale, which is promoted by Rensis Likert [20], is specifically widely applied to understand respondent's level of agreement or disagreement for a series of statements. As cooperatives performance can be measured by the degree to which the cooperatives are capable to satisfy the "needs" of members [21], members' satisfaction with various cooperatives services, their attitudes toward cooperatives operation, as well as their evaluation on cooperatives finance-based and competitive abilities are estimated by five-likert scale ranging from "1=very dissatisfied/bad/untrusted" to "5=very satisfied/good/trusted" (see Table I for the detail).

The purpose of this research is to identify the potential factors influencing member's investment willingness on the sustainable development of cooperatives. Member's investment willingness is also measured by the five-point Likert scale. They were asked to choose a number from "1=highly unwilling-to-invest" to "5= highly willing-to-invest." Thus, the ordered logit model is used to highlight the significant factors on member's investment willingness [22].

$$y^* = \alpha x' + \mu \quad (1)$$

where y^* is an unmeasured latent variable, x is the vector of independent variables, α is the regression coefficients which we wish to estimate, and μ is the random error.

Since y^* is an unobservable variable, we can observe the categories of response by:

$$\begin{aligned} y_i &= 1 \text{ if } y_i^* \leq m_1 \\ y_i &= 2 \text{ if } m_1 < y_i^* \leq m_2 \\ y_i &= 3 \text{ if } m_2 < y_i^* \leq m_3 \\ &\vdots \\ y_i &= N \text{ if } m_{N-1} < y_i^* \end{aligned} \quad (2)$$

In our study, the continuous latent variable y^* has five threshold points. We categorized the response into three thresholds among 1 to 5 which are low, medium, and high. Thus, when $N = 3$,

$$\begin{aligned} y_i &= 1 \text{ if } y_i^* \leq 2 \\ y_i &= 2 \text{ if } 2 < y_i^* \leq 3 \\ y_i &= 3 \text{ if } 3 < y_i^* \end{aligned} \quad (3)$$

Then the ordered logit regression will apply the observations on y_i to fit the parameter vector α . The detail information of independent variables are illustrated in Table I. The expected coefficient sign is also shown in Table I.

Theoretically, it is expected that the investment willingness will be positively affected by the member's trust in cooperatives, satisfaction with cooperative services, finance-base abilities including returns to capital, loan, and profitability, as well as the evaluation on cooperative development potential. Previous research result presents that trusts among members and between members and managers are critical indicators to estimate the degree of member's commitment to their cooperatives [23]. With respect to member's demographics and farm characteristics, and the reputation of cooperatives in local area, neither theory nor the results of face-to-face interviews produce a clear-cut answer: the expected sign for the corresponding coefficients is uncertain. In terms of cooperative operational scale, the previous research results hold different opinions: reference [24] suggests that larger cooperatives tend to ignore the opinions of their small members and even deprive them of benefits, and thus discourage them from investing in the cooperative; whereas reference [16] argue that only large cooperatives can afford the investment requirement in the future development. Thus, the coefficient sign is uncertain.

TABLE I
VARIABLE DESCRIPTION

Variable description	Code	Variable scale	Expected sign
Farmer demographics & farm characteristics			
Age of farm household	<i>AGE</i>	Years	+/-
Academic educational attainment	<i>AED</i>	Years	+/-
On-farm experience	<i>OFE</i>	Years	+/-
Off-farm experience	<i>OFF</i>	0=no, 1=yes	+/-
Farm size	<i>FSI</i>	Mu (1 mu=0.0667hectare)	+/-
On-farm income	<i>ONI</i>	Yuan	+/-
Off-farm income	<i>OFI</i>	Yuan	+/-
Member's trust in cooperatives	<i>TUT</i>	1=Very untrust 2=Untrust 3=Moderately 4=Trust 5=Very trust	+
Cooperative service ability evaluation			
Technique dissemination	<i>TEC</i>	1=Very dissatisfied 2=Dissatisfied 3=Moderately 4=Satisfied 5=Very satisfied	+
Price preferential	<i>PRI</i>		+
Processing services	<i>PRO</i>		+
Finance-based ability evaluation			
Returns to capital	<i>RTC</i>	1=Very bad 2=Bad 3=Moderately 4=Good 5=Very good	+
Agricultural loan	<i>LOA</i>		+
Profitability	<i>PRF</i>		+
Competitive ability evaluation			
Operational scale	<i>SCA</i>	1=Very bad 2=Bad 3=Moderately 4=Good 5=Very good	+/-
Reputation in local area	<i>REP</i>		+/-
Development potential	<i>DEP</i>		+

III. DESCRIPTIVE RESULTS

This section is focus on the descriptive statistics analysis of four main parts of data (see Table II):

- Member demographics, farm characteristics, and the degree of trust in cooperatives
- Satisfaction with various cooperatives services
- Evaluation on cooperative finance-based ability
- Attitudes toward cooperatives competitive capability

Note that there are totally eight cooperative services listed in Table III, which grouped into three sections of services referring to technique dissemination, price preferential and processing services. The three variables are used in the ordered logit regression.

TABLE II
STATISTICS DESCRIPTION

	Code	Mean	St. Dev.	Probability
Farmer demographics & farm characteristics				
Age of farm household	<i>AGE</i>	53.66	8.77	0.93
Academic educational attainment	<i>AED</i>	8.93	2.60	0.00
On-farm experience	<i>OFE</i>	18.07	4.10	0.13
Off-farm experience	<i>OFF</i>	0.19	0.39	0.00
Farm size	<i>FSI</i>	6.79	3.46	0.00
On-farm income	<i>ONI</i>	23.24	20.60	0.00
Off-farm income	<i>OFI</i>	4.29	6.82	0.00
Member's trust in cooperatives	<i>TUT</i>	3.98	0.79	0.02
Cooperative service ability evaluation				
Technique dissemination	<i>TEC</i>	3.71	1.05	0.00
Price preferential	<i>PRI</i>	3.06	0.99	0.40
Processing services	<i>PRO</i>	1.83	0.81	0.00
Finance-based ability evaluation				
Returns to capital	<i>RTC</i>	1.40	0.77	0.00
Agricultural loan	<i>LOA</i>	1.52	0.94	0.00
Profitability	<i>PRF</i>	2.34	1.04	0.06
Competitive ability evaluation				
Operational scale	<i>SCA</i>	3.19	1.02	0.30
Reputation in local area	<i>REP</i>	3.48	1.11	0.02
Development potential	<i>DEP</i>	3.30	1.04	0.05

A. General Characteristics of Members

Table III summarizes several demographic and farm characteristics for all members. The average age of household head in sample areas is about 54, the academic educational years is 8.93 which means finished the junior high school education. The mean value of on-farm experience is just over 18 years. Regarding to family incomes, on average, the on-farm income reached 23.24 thousand yuan per year, whereas the off-farm income is only about 4.29 thousand yuan annually.

With respect to the attitudinal evaluation, averagely, members rated their trust in cooperatives, the services of technique dissemination, price preferential, and cooperative competitive ability as trust/satisfied/good. Conversely, a number of members valued cooperative finance-based ability and the provision of product processing services as very bad/dissatisfied. Particularly, on the basis of our field survey, 74.59% members said they are trust or very trust in cooperatives, still 3.28% took cooperatives as untrusted.

B. Satisfaction with Cooperative Services

The attitude toward cooperative services can be regarded as a factor affecting members' investment willingness. Table III illustrates the satisfaction that respondents attach to services provided by a cooperative. The satisfaction evaluation is quite different for members among the eight services. The satisfaction rates with processing services related to product package, grading, and storage, are considerably lower, with logistic services (product storage, grading, and package) perceived as unsatisfactory by a very high proportion of

members. Conversely, services of technique dissemination gained the highest satisfaction among all the services, in which 88.52% members were satisfied or very satisfied with the provision of training and market information. Cooperatives also seem to excel in provision of insect and disease control, access to market information, and management of apple orchard, with high satisfaction rates reported with these services.

TABLE III
EVALUATION ON VARIOUS COOPERATIVE SERVICES

Items	Dissatisfied	Moderately	Satisfied
Technique dissemination			
Training & information provision	3.28	8.20	88.52
Disease & insect control	18.03	13.11	68.03
Standard management of orchard	27.87	14.75	57.38
Price preferential			
Discount on farm inputs purchase	22.95	32.79	44.26
Higher purchasing price of cooperatives than market price	37.70	29.51	32.79
Processing services			
Product package	68.85	13.11	18.03
Product grading	79.51	12.30	8.20
Product storage	79.51	14.75	5.74

For the purpose of presentation, the five Likert-scale categories were combined into three: in this table "satisfied" combines the frequencies of "very satisfied" and "satisfied" responses; "dissatisfied" combines the frequencies of "very dissatisfied" and "dissatisfied" responses

Moreover, the price preferential services, associated with the discount on farm inputs purchase and the higher cooperative purchasing prices than the market prices record a relatively low satisfaction rating (44.26% and 32.79%, separately). In fact, these services were taken as very important ones by members based on the field discussion. About one-third took moderately satisfaction with these services.

As a whole, member's satisfaction with distinct cooperatives services reflects a poor provision of processing-based services. This can be, to a certain extent, attributed to the lack of fund to the construction of storage equipment and the insufficient rural labor to grade products.

C. Evaluation on Finance-Based and Competitive Ability

Members were asked to evaluate the finance-based ability and the competitive capability of their cooperatives by six indicators (Table IV). In general, members presented lower scores on the finance-based capability indicators. Members rated relatively highly the cooperative's reputation in local area (56.56%) and its development potential (50.82%). 38.52% members considered their cooperatives as large operational scale. On the other hand, the finance-based ability to the cooperatives received very low ratings: 88.52% members judged the ability of return to capital as bad or very bad; 82.79% perceived the ability to obtain agricultural loan as bad or very bad; more than half of the members rated the profitability of their cooperative as poor or very poor.

TABLE IV
EVALUATION ON FINANCE-BASED & COMPETITIVE ABILITY

Items	Bad	Moderately	Good
Finance-based ability			
Returns to capital	88.52	9.84	1.64
Loan	82.79	11.48	5.74
Profitability	54.92	30.33	14.75
Competitive ability			
Operational scale	20.49	40.98	38.52
Reputation in local area	17.21	26.23	56.56
Development potential	23.77	25.41	50.82

For the purpose of presentation, the five Likert-scale categories were combined into three: in this table "good" combines the frequencies of "very good" and "good" responses; "bad" combines the frequencies of "very bad" and "bad" responses.

IV. INVESTMENT REGRESSION

The willingness to invest was explained in order logit regression by four blocks of variables: (1) farmer demographics and farm characteristics; (2) degree of satisfaction with cooperative services; (3) member evaluation of cooperative finance-based ability; (4) member evaluation of cooperative competitive capability. The regression results are presented in Table V.

Among seven variables representing farmer demographics and farm characteristics, only one variable—farm size—produce a statistically negatively significant effect on members' willingness to invest, the estimated coefficient is -1.8146 . Among the nine variables representing member evaluation of cooperative service, finance, and competitive ability, the estimated coefficients are statistically significant for three variables only: service ability to price preferential, evaluation on cooperative operational scale, and cooperative's development potential. With respect to the trust in the cooperative, the regression coefficient is not statistically significant.

The variable—farm size—negatively affect member's investment willingness, the coefficient is -0.1236 (statistically significant at $p=0.10$). The result can be translated into that the increasing of farm size of members lead to a decrease willingness-to-invest. It partly due to that member with larger farm size having a larger transaction volume and therefore having comparatively stronger negotiation power with the buyers, they have positive position in choosing the potential buyers, i.e., cooperatives, wholesalers, or other agents, who offers the highest purchase price. Moreover, in combination with our field discussion, these members pay less attention to the further development of their cooperatives than those with small farm size who depends much on cooperatives services.

Indeed, as the evaluation scores for satisfaction with various services range from 1=very dissatisfied to 5=very satisfied, the positive sign of the estimated coefficients implies that higher scores (i.e., better evaluations) increase member's willingness to invest in the cooperative. Specifically, members who evaluate the cooperative service as satisfied (high score) is more likely to be willing to invest than members who are dissatisfied with the cooperatives services (low score). It is reasonable that cooperatives provide good services of price

preferential including discount on agricultural input buying and the higher purchase prices of cooperatives than the market prices are more likely to obtain the investment from their members.

TABLE V
REGRESSION RESULTS

Variable	Coefficient	Std. Error	z-Statistic
Farmer demographics & farm characteristics			
Age of farm household	0.0041	0.0270	0.1519
Academic educational attainment	0.1493	0.0937	1.5932
On-farm experience	-0.0826	0.0586	-1.4098
Off-farm experience	0.5648	0.6144	0.9192
Farm size	-0.1236	0.0681	-1.8146*
On-farm income	-0.0098	0.0131	-0.7482
Off-farm income	-0.0177	0.0357	-0.4956
Member's trust in cooperatives	0.1252	0.3182	0.3935
Cooperative service ability evaluation			
Technique dissemination	-0.2377	0.2557	-0.9295
Price preferential	0.4930	0.2747	1.7947*
Processing services	-0.1537	0.3195	-0.4809
Finance-based ability evaluation			
Returns to capital	-0.2120	0.3592	-0.5903
Loan	0.2499	0.2648	0.9437
Profitability	0.2354	0.2487	0.9467
Competitive ability evaluation			
Operational scale	-0.4960	0.2610	-1.9004*
Reputation in local area	-0.0505	0.2526	-0.1998
Development potential	1.8769	0.3469	5.4098***

Note: * significant at $p = 0.10$; *** significant at $p = 0.01$ level

Similarly, the estimated coefficient for the development potential of the cooperative is positive (statistically significant at $p=0.05$). As the score for development potential increases from 1=very bad to 5=very good, the result implies that members are more willing to invest in cooperatives with larger development potential. It can be attributed to the meaning of "development potential" in our questionnaire. The dominant predictor of cooperatives development potential related to the potential of negotiation power and obtaining capital support from local or central government. Thus, it is explicitly that cooperatives with larger development potential are better able to attract member investments, because they generally have stronger market power and because they can afford to invest in training, equipment, infrastructure, and monitoring systems, thus further increasing the members' benefits [16]. The regression results can be also confirmed by the results of descriptive analysis in Table IV, where the proportion of members viewing cooperative development potential as good or very good is comparatively higher than other predictors.

The operational scale of the cooperative has a statistically negative estimated coefficient (-0.4960). As the scores for this variable range from 1=very small to 5=very large, the increase of cooperative scale decreases the probability of members' willing to invest. The possible explanation is that with the increasing of cooperative scale, cooperatives ignore the opinions or even benefits of small-scale members. This behavior of large cooperatives may alienate small members

and thus discourage them from investing in the cooperative [24]. Moreover, the result is also consistent with the findings presenting by [17] that small cooperative have higher profitability and liquidity, whereas the benefits of size of large cooperatives do not necessarily lead to higher profitability.

V. CONCLUSIONS

The key objective of the study is to identify the factors that determine member's willingness to invest in the cooperative using ordered logit model. The descriptive analysis of survey evidence suggests that cooperatives in China generally having poor ability to deliver the processing services related to product package, grading, and storage, performing worse profitability, the inability of providing returns to capital, as well as obtaining agricultural loan. The regression results demonstrate that members' farm size, their satisfaction with price preferential services, attitudes toward cooperative operational scale and development potential have statistically significant impact on willingness to invest. According to the results, several implications can be derived from the study.

Attractive services should be promoted to stimulate members with large farm size to invest in cooperatives, as those members have relatively higher product trading volumes and much more family incomes than those with small farm size based on the field survey.

The leader of cooperatives should be encouraged to foster a more strongly sense of member satisfaction with price-related services. Specifically, services regarding to discount on agricultural inputs purchase and higher purchase price of cooperatives should be strengthened in order to encourage member's investment willingness.

Member investment willingness appears to be negatively related to enlarge the operational scale of cooperatives. In other words, cooperative managers should put more effort on upgrading their development potential rather than enlarging the size of cooperatives, particularly in the initial stage of cooperatives.

In China, indeed, if limited to economic support, agricultural cooperatives are difficult to be operated. In the long run, policies and strategies considerations of local or central government should foster an environment conducive to support the development of local cooperatives. The success of a cooperative depends in part on the financial support from local government on equipment construction to alleviate the financial burdens, such as building package equipment, value-adding processing facilities and the cool storage facilities which cost much more than other services. By and large, cooperatives should prepare with all the facilities and services for members to motivate the tendency toward investment in the continued development.

VI. LIMITATIONS

With the constraints of budgets and the limitation of questionnaire design, the performance information related to economic and social factors affecting member's investment

willingness are not collected in the field survey. This is left to the future research.

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