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Full Length Research Paper

Factors affecting farmers' willingness to pay for agricultural extension services: The case of Haramaya District, Ethiopia

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As a result of the rapid changing situation of agriculture, inability of public extension services to be responsive to the needs of farmers and changing of policy environment, new paradigm is emerging. The focus of this new paradigm is pluralism, the emergence of multiplicity of actors providing extension services. This study was designed to assess factors affecting farmers' willingness to pay (WTP) for extension services in Haramaya District, Ethiopia. A total of 134 households were selected randomly and interviewed using interview schedules prepared for the purpose. The data were analyzed using both descriptive and econometric model (Logit model). The results of the study from the analysis of determinants of the willingness to pay from logit model showed a significant positive relationship between WTP and household income, and farm size. Other household characteristics such as household age, media exposure, and family size were found negatively and significantly related with WTP. Finally, this study recommended that by targeting farmers, with high level of income, large farm sizes, and household with small family size, the commercialization of extension services would take the advantages of these features and hence their greater abilities to pay for extension services.

Key words: Willingness to pay, agricultural extension, Haramaya, Ethiopia, logit.

INTRODUCTION

Since time in memorial, agricultural production in Ethiopia has remained subsistent with limited commercial orientation. This heavily limited the rural transformation which the country is demanding. Currently, the government of Ethiopia is striving to bring rural transformation through commercialization of agriculture. This in turn demands re-orientation of the production system and development of a knowledge based and responsive institutional support services (Azage et al., 2005; Berhanu et al., 2006). The agricultural extension service is one of the institutional support services that have a central role to play in the transformation process.

Agricultural Extension services in Ethiopia is said to have started in 1931. Since then, extension system of the country passed in the process of change. According to Mohamad (2004), until the Ethiopian People's Revolutionary Democratic Front (EPRDF) launched new extension program called Participatory Demonstration and Training Extension System (PADETS) in 1995, the extension program in the country was funded by foreign donors. PADETS became the first extension program to be developed without foreign assistance and fully funded by the government budget.

Though extension service has gone through radical

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policy shift, the question still remains whether the extension system of the country established effective extension system that meets the needs of its clients. It is confronting many challenges including problems related to coverage; complexities involved in the service; the critical role of other institutional support services such as input supply, credit and agricultural marketing; inadequate public funding; and insufficient appropriate and relevant technologies (Belay, 2003; Habtamariam, 2004; Berhanu et al., 2006, Davis et al., 2009).

These situations are calling for an alternative paradigm. The new paradigm mainly focuses on the emerging view of extension which is no longer waiting that of a unified service provider to respond to increasingly complex market, social and environmental demands within an increasingly diversified agricultural sector which demands more sophisticated and differentiated set of services. In line with this, Berhanu et al. (2006) critically commented that extension system of Ethiopia should develop pluralistic framework and demand driven to respond to the changing nature of the country's agricultural situation. The farmers' problems and agricultural technology become ever more complicated that they can no longer be dealt with effectively from a centralized public entity.

Moreover, the government emphasis on commercialization of the agricultural sector has implications for the organization, staffing and operation of the agricultural extension service (Berhanu et al., 2006). Despite the fact that public financing extension service is very often justifiable for a poor country like Ethiopia, there should be a means whenever possible to the private sector or other delivery arrangement to achieve more effectiveness, efficiency and sustainability by combining financial sources and competences of various actors (Rivera et al., 2000; Anderson, 2007; Ozoret et al., 2007). Options or alternative strategies for financing agricultural extension services should be analyzed and understood to make the services responsive to the needs of the farmers. In searching for new funding and delivery arrangement, issues, such as producers' willingness to pay, for which services and how much they are willing to pay arise and become extremely important (Rivera et al., 2000). At the same time, where extension services have previously been provided free of charge, assessment should be made to understand commercial demand for agricultural information. However, such information is lacking in the country. Literatures available at present on this concern are more on international experiences. Ethiopian experiences need to be documented, analyzed and disseminated for the better understanding and implementation of commercial extension concept and how to achieve collaborative efforts in Ethiopian context in general and Haramaya district in particular. Thus, this study was grounded on the stated problems to provide empirical evidences on factors affecting farmers' willingness to pay for advisory services in Haramaya district.

Objectives of the study

The study generally aimed to determine factors affecting farmers' willingness to pay for agricultural extension service in Ethiopia. Specifically, it was meant to assess factors affecting farmers' willingness to pay for extension services.

MATERIALS AND METHODS

This study was conducted in Haramaya district, located in East Hararghe zone of the Oromia Regional State, Ethiopia. Haramaya is one of the nineteen districts in Eastern Hararghe zone with an estimated size of 52,163 ha. According to CSA (2007), the population of Haramaya district is 215,140 (26,129 Urban and 189,011 Rural). The district is the most densely populated area from the zone. The estimated density is 335.16 persons per km^2. It is situated in the semi-arid tropical belt of eastern Ethiopia and characterized by a sub-humid climate with an average annual rainfall of about 790 mm, annual mean temperatures of 17°C with mean minimum and maximum temperatures of 9.4 and 24°C, respectively. Its altitude ranges from 1600 to 2100 m above sea level. There are 33 peasant associations in the district. A multistage random sampling technique was used in selecting the respondents. In the first stage, four peasant associations, namely: Damota, IfaOromiya, AdelleWelta'a and BiiftuuGeda were randomly selected from existing peasant associations in the district. In the second stage, the sample household percentage proportion to be selected per each sample PA was calculated by using probability proportional to size technique based on the total numbers of respondents which is 140 household heads. Accordingly, valid responses for analysis were obtained from a total of 140 farmers comprising 40, 42, 33 and 25, farmers from Damota, IfaOromiya, BiiftuuGeda and AdelleWelta'a respectively. However, six household heads did not respond to the interview schedules fully. Hence, they were discarded from the analysis.

For this study, primary and secondary data were used. Primary data were collected from sample household heads, focused group discussants and key informants. Secondary data were collected from various sources such as books, journals, online materials, reports and other relevant documents from district offices of the agriculture and rural development. To achieve the objectives of the study, combination of suitable qualitative and quantitative data were collected. To collect quantitative data, semi-structured interview schedules were used. The interview schedules had questions

related to socioeconomic, demographic and institutional characteristics of the households, information such as current sources of information, the nature and extent of contact between the farmers and public extension agents, farmer WTP for extension services, and so on from farmers. For the purpose of qualitative data collection, checklists were prepared and employed as an instrument.

Before using the survey instruments, both checklists and interview schedules were pre-tested twice in non-sampled respondents. The information generated during pre-testing was incorporated and modification of interview schedules and checklists were made before implementation of data collection. In this particular study, both descriptive (such as percentage, mean, standard deviation, frequency of appearance, etc.) and econometric models (Logit model) were employed to analyze the data. The Statistical Package for Social Science (SPSS) was used for data analysis.

Logit model specification

As already noted, the purpose of this study is to analyze which, how and how much the hypothesized regressors are related to the dependent variable. The dependent variable in this case is a dummy variable, which takes a value of zero or one depending on whether or not a farmer is willing or non-willing to pay for extension services. However, the independent variables are both continuous and binary. Following Pindyck and Rubinfeld (1981), the cumulative logistic probability function is specified as:

$$P_i = F(Z_i) = F = (1/_{1+}e^{-(\alpha+\sum\beta_i x_i)}) \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

where: Pi represents the probability that i^{th} household will make a certain choice (in this case willing and non-willing), given explanatory variables (Xi); e represents the base of natural logarithms; Xi represents the explanatory variables; mi represents the number of explanatory variables, i = 1, 2, 3 …, m; and α and β_i are parameters to be estimated.

Coefficient interpretation will be understandable if the logistic model is once written in terms of the odds and log of odds (Hosmer and Lemeshow, 1989). The odds ratio is simply the ratio of the probability of being willing (Pi) to the probability that he/she would be non-willing (1-Pi). But Pi is non-linear not only in Xi but also in α_i and β_i which creates an estimation problem. So, we cannot use the familiar OLS procedure to estimate the parameters:

But 1-Pi = ………………………………………………………… (2)

Therefore, the odds ratio becomes:

$$\frac{p_i}{1-p_i} = \frac{1+e^{Z_i}}{1+e^{-Z_i}} = e^{Z_i}. \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

Or

$$\frac{p_i}{1-p_i} = \frac{1+e^{Z_i}}{1+e^{-Z_i}} = e^{\left(\alpha+\sum_{i=1}^{m} B_i X_i\right)} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (4)$$

Therefore, to get linearity, we take the natural logarithms of odds ratio equation (4), which results in the logit model as indicated below:

$$Z_i = \mathrm{Ln}\left(\frac{p_i}{1-p_i}\right) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_m X_m \quad \ldots\ldots\ldots\ldots \quad (5)$$

As P goes from 0 to 1, the logit goes from -∞ to ∞. That is, although the probabilities lie between 0 and 1, the logits are not so bounded (Gujarati, 1995).

If the disturbance term Ui is taken into account, the logit model becomes:

$$Z_i = \alpha + \sum_{i=1}^{m} \beta_i \chi_i + u_i \quad \ldots\ldots\ldots\ldots \quad (6)$$

Hence, the above econometric model was used in this study and was treated against the potential variables affecting willingness to pay for Agricultural Extension services.

RESULTS AND DISCUSSION

Factors affecting farmers' willingness to pay for extension services

Here, the results of both descriptive statistics and econometric analysis on factors affecting WTP for extension services are discussed in detail. Before running econometric model, attempt was made to test the difference between willing and non-willing groups with

Table 1. Differences of dummy explanatory variables between willing and non-willing households.

Variable	Willing		Non-Willing		Total		χ^2	Expected sign
	No.	%	No.	%	No.	%		
Sex								+
Male	86	100	36	75	122	91	7.388***	
Female	-	-	12	25	12	9		
Irrigation use								+
Yes	35	40.6	29	60.4	64	47.8	4.801**	
No	51	59.4	19	39.6	70	52.2		
Credit service use								+
Yes	3	3.4	4	8.3	7	5.2	1.461	
No	83	61.9	44	91.7	127	94.8		
Listening mass medias								+
Yes	53	61.6	14	29.2	67	50	12.984**	
No	33	38.6	34	70.8	67	50		

Source: Own survey; *** and ** significant at 1% and 5% probability levels respectively.

respect to some key characteristics of the respondents. In order to understand the existing socio-economic and institutional characteristics of sampled households with respect to WTP for extension services, the descriptive analysis such as: mean, minimum and maximum values, percentage and ranges were undertaken. The mean difference for continuous variables and frequencies of discrete variables were tested using t-test and chi-square test, respectively.

Some key characteristics of the respondents

Sex composition of the respondents (SEX)

Sex of household head is one of the factors influencing investment in extension services. Demanding advisory services on payment requires sufficient resources, such as land, livestock, etc., which female headed households usually lack. From the total sample households, about 9% were female headed and 91% were male headed households. All female household heads were non-willing to contribute money for extension service at all. Men were more ready to make payment than women. The difference in WTP between men and women is statistically different (Table 1).

Leadership status of the respondents (LDSHP)

Of the total sampled households, 47.8% had different social status in their local setting. The rest 52.2% of the sampled household heads did not participate in formal and informal leadership position in any case. When the two groups are compared, willing and non-willing, 54.7% of willing group had different social status in the locality, while only 35.4% of non-willing respondents had social status.

The higher figure for the respondents who agreed to participate through contributing money for extension services while compared with the non-willing ones may be an indicator of when an individual participate in management or leading roles, the individual can realize as change is required and hence understand the roles extension can play thereby deciding to pay for extension services. The χ^2 –test result (Table 1) shows that there is a statistical significant mean difference between paying and non-paying respondents with respect to leadership status of the household (χ^2 P=4.568) at less than 5% probability levels.

Irrigation use (IRRIG)

The choice of this explanatory variable was found important based on literature on past studies and it was found among the respondents and considered after the proposal writing. Irrigation is one of the important facilities to realize the commercialization of agriculture which could be supportive environment for commercialization/privatization of agricultural extension services. Accordingly, the availability of irrigation was found as a critical factor which can facilitate or impede

Table 2. Differences of continuous explanatory variables between willing and non-willing households.

Variable	Willing	Non-willing	Total	t-value	Expected sign
	Mean	Mean	Mean		
Age	37.5	45.3	40.3	3.636***	-
Education	3.3	2.0	2.81	-1.640**	+
Family size	6.7	7.2	6.9	0.829**	-
Extension contact	8.1	7.6	7.9	7.995	+
Total livestock unit	2.5	2.3	2.5	-1.359	+
Farm experience	21.9	27.9	24.06	2.435**	+
Farm size	0.98	0.87	0.93	0.563	+
Income	11710.5	8777.3	10659.8	-1.780*	+

Source: Own survey; ***, ** and * significant at 1%, 5% and 10% probability level respectively.

the farmers' willingness to pay. During the survey, farmers who had negative attitude towards WTP for extension services revealed that fee based kind of extension service can work only for those who have irrigation to grow cash crops to earn cash income. On parallel, those farmers who had demanded quality information through payment indicated that they need advice on how to get irrigation technologies.

The data presented on Table 1 clearly depict that majority of respondents (52.2%) possessed irrigation; from which large proportion goes to willing farmers. 59.4% of farmers who had replied yes to the WTP question had used irrigation as compared to 39.6% of non-willing groups. Large proportion (60.4%) of non-willing groups lacked irrigation and only waited rain to grow vegetables and other annual crops. The mean difference is significant at 5% probability level.

Credit use (CREDIT)

Credit service is one of the important institutional factors to ensure agricultural development and overall rural development. It can solve financial constraints of farmers to purchase and use improved agricultural inputs. However, there are no strong institutions to facilitate credit service to make the farmers use credit in sustainable manner. During the survey, the respondents indicated that there was no sustainable and strong credit supply in the study area. In line with this, very small proportion of the respondents (5%) had accessed credit services. The difference between willing and non-willing group with respect to credit use is not statistically significant.

Mass media exposure (LSTR)

It was hypothesized that listening to radio programs on agricultural issues has strong positive influence on willingness to pay. This could be that hearing information on the radio/mass media encourages farmers to seek additional or more detailed information enough to convince them that it would be worthwhile to pay for it. The data presented in Table 1 clearly visualize that 50% of the respondents was listening to the radio. The result of the survey also portray that 70.8% of non-willing respondents were not listening to the radio program. Likewise, 38.4% willing respondents were not listening to the radio program. The difference is statistically significant at $\chi^2 = 12.984$.

Age of the respondents (AGEHH)

These characteristics may affect the farmers in their willingness to pay for extension services. The data included in Table 2 reveal that the average age in the sample was 40.3, 37.5, and 45.3 years for all respondents, willing farmers and non-willing farmers respectively. A close look at the data further substantiate that the mean difference was found statistically significant at less than 1% probability level.

Education background of respondents (EDHH)

Education is very important to understand and manage the environment in which one operates. It is assumed that as one learn more from formal education, he/she understands and interprets the information they get from any source. There is no exception to farmers. Farmers who learned more may need farm specific information to manage their farm effectively on fee-for-service basis rather than confining themselves to general public goods.

The results of the survey show that from the sampled households, 50.7% were illiterate and 18.6% attended junior and high school formal education. As evident from the data accorded in Table 2, 66.7% of non-willing respondents were illiterate as compared to 41.9% of the

willing groups. It was also observed that the average years of schooling for those respondents who were willing to pay and those who were not willing to pay were 3.3 and 2.0 respectively.

As hypothesized, the average years of formal schooling of those respondents who expressed their willingness to pay was greater than those non-willing farmers and the difference is statistically significant. Equally important, during qualitative survey, though the general trend goes with pre-assumed hypothesis, some puzzling responses were found. Some of the respondents who completed the high school formal education refused to pay for extension services because they may have alternative sources of information which are free from any kind of payment.

Farm experiences of household heads (FXPHH)

Farm experience is generally related to age of farmers in our country setting. This is because, most of the farmers entered into the business at their early young age with their families. About 80% of the respondents who were willing to pay are found in the ranges of 4 and 25 years of experience; while 44% proportion of non-willing farmers had more than 25 years of experience. The average years of farm experiences were 24.1, 21.9 and 28.6 years for total respondents, willing and non-willing respondents respectively (Table 2). Evidences from many literatures disclose that farmers with longer farm experience confine themselves to their traditional knowledge rather than seeking new public information let alone information on payment basis. The result of this study also show that the mean experience of non-willing respondents was higher than that of willing household heads and the difference was found as statistically significant at less than 5% probability levels.

Family size of the household (FAMSIZE)

The average family size of the total respondents, willing and non-willing respondents were 6.9, 6.7 and 7.2 persons respectively. The largest family size observed was 17. Furthermore, 78.6% of the sampled households had a family size between 4 and 9. Likewise, 41% of the respondents had family size between 4 and 6. As the data in Table 2 corroborate, the average family size of willing and non-willing respondents was found to be 6.72 and 7.2 persons respectively. The family size of willing household heads was smaller than that of the non-willing groups and the mean difference was found to be statistically significant at less than 5% probability level.

Total land holdings of households (FARMSIZE)

Farm size is an indicative of wealth and income which in turn are highly related to the possibility of acquiring more agricultural information. As the data obtained vividly substantiate that the respondents' possession of cultivable land ranged from the smallest 0.125 ha (which is equivalent to 0.5 "timad") to the highest 3.75 ha (approximately 15 "timad"), the majority of the respondents (76.2%) had less than one hectare land to cultivate. Likewise, 21.9% respondents were found in the category of small land cultivators (1.25 - 2 ha) and the rest 6.7% respondents fell in the category of more or less big farm tillers (greater than 2 ha). Furthermore, as the data included in Table 2 showed, the average land holding of the sampled household was 0.93 ha, less than one hectare. This result agrees with the Bureau of Agriculture and Rural Development office report. According to this report (BoARD, 2007), 67.6% of the farmers in the district hold between 0.5 and 1 ha of land. 20.6% farmers hold between 0.25 and 1 ha of land. The remaining 11.8% hold greater than 1 ha. Closer looks at the data in Table 2 further revealed that both willing and non-willing groups were found similar in total land holdings. The mean land holdings of the households that expressed their willingness to contribute money for extension services and that of those non-willing groups was 0.98 ha and 0.87 ha respectively. Those willing groups possessed slightly larger farm size than the non-willing households. However, the mean difference is not statistically significant.

Total livestock unit (TLU)

Mixed farming system is very common in the high land and middle altitudes of the country. The crop and livestock subsystems are integrated. The same is true in the study area. However in Haramaya, oxen were not commonly used as drought power sources. Preparation of land is undertaken by hand and renting oxen from the neighbor districts. The farmers in the study area are known for fattening of their oxen; oxen are used only for cash income source through selling.

Many studies confirmed that farmers who have better livestock position adopt extension recommendation more readily and they have positive attitude to pay for extension because livestock is considered as bank account for farmers. Thus, it is assumed that farmers who are in a better position in livestock holdings are more ready to invest for extension services. However, in this particular study, the respondents were found almost at the same livestock holding position.

According to the survey result, the average TLU was 2.53, 2.29, and 2.45 for the total respondents, the willing farmers, and non-willing farmers respectively. While willing and non-willing groups are compared, the mean TLU of willing group is slightly greater than that of farmers who have negative attitude towards payment for extension services. However, the difference is not

statistically significant.

Farm income of the respondents (INCOME)

Cro
p production was the main source of income for the majority of the farmers surveyed. Major food crops in the area are sorghum and maize. As the respondents revealed, these crops were mainly used for home consumption. Most of the households did not have an extra product for market beyond their household consumption. Their main sources of cash income were from chat and vegetables. Vegetables such as carrot, root beat, onion, cabbage, tomato, and potatoes were widely grown in the study area. Those farmers who had access to irrigation produce twice annually. Farmers who do not have irrigation access produces once per year using rain. Chat and vegetables were found as the main sources of cash income to respond to cash demands of the households. Majority of respondents indicated that they buy food crops through selling these cash crops.

The average income for all respondents was 9187.67 Birr annually. Total households' earnings range from the smallest 750 Birr to the highest 53,250 Birr per-annum. The mean total income of respondents who had positive attitudes toward fee-for service for extension services and non-willing farmers, respectively, was 8777.29 and 11710.50 Birr annually (Table 2). The mean earning of willing sample household heads is greater than those non-willing groups. The independent t-test shows that the mean difference is statistically significant at 10% probability level.

Frequency of visit by the development agent (EXCTACT)

It was hypothesized that households who are more frequently visited by the development agents build awareness and bring voluntary behavioral change. They can also realize the role of extension in improving livelihoods of farmers and taste the value of information better than those less frequently visited. However, frequency of visit alone cannot ensure the quality of the services.

As evidence, from the survey result, 46.3% of the respondents had not been visited by development agents for the last crop season. Of the total sampled household heads, 35% visited twelve or more per year. When willing and non-willing groups were compared, 54.2% of the non-willing households and 41.9% of the willing households had not been visited by development agents for the last crop season. The average visit for the proportion of the respondents who were willing to pay and those expressed themselves as non-willing to pay was 8.1 and 7.6 times respectively, which is slightly for the willing households, though the difference in mean is not statistically significant.

Empirical results

To identify determinants of WTP for agricultural extension services, among hypothesized explanatory variables that are supposed to have influence households, binary logit model was estimated using a statistical package known as SPSS version 17. In total, 13 independent variables were used for estimation. These are education, family size, farming experience, farm size, tropical livestock unit, credit access, sex, age of household head, leadership status, income, irrigation availability, frequency of extension visit, and listening to the radio. These variables were selected on the bases of theoretical explanation and the results of various empirical studies. Moreover, they were selected by testing significant differences of the mean using t-test and χ^2, and testing the existence of muliticollinearity using Variance Inflation Factors (VIF) and contingency coefficients.

The various goodness of fit measures were checked and validated, and it was observed that the model fits the data. The likelihood ratio test statistics exceeds the Chi-square critical value at less than 1% probability level. This implies that the hypothesis, which says all coefficients except the intercept is zero, was rejected. The value of Pearson Chi-square test shows the overall goodness of fit of the model at less than 1% probability level.

Another measure of goodness of fit of the model is based on a scheme that classifies the predicted value of events as one if the estimated probability of an event is equal or greater than 0.5 and 0 otherwise.

From all sample farmers, 80.6% were correctly predicted into willing and non-willing categories by the model. The correctly predicted willing and correctly predicted non-willing of the model were 82% and 78.1%, respectively.

The estimated model, thus, groups willing and non-willing sampled respondents accurately. The maximum likelihood estimate of the parameters and the effect of the independent variables on probability of WTP were analyzed and presented in Table 3.

From 13 variables included into the model, five were found to be statistically significant at different significance levels.

Result from the logit model shows that listening to the radio/mass media (LSTR) was found significant at less than one percent probability level. Farm size (FARMS) and household income (INCOME) were found to be significant at less than 5% significance level. The other two variables, household age (AGE) and family size (FAMS), were significant at less than ten percent probability level.

Table 3. The maximum likelihood estimates of the logit model.

Variable	Coefficient	Wald - statistics	Marginal effect
Constant	1.691		
AGEHH	-0.139	3.399	-0.016*
EDHH	-0.056	0.273	-0.014
FAMSIZE	-0.235	3.307	-0.015*
EXCTACT	0.030	1.575	0.005
TLU	0.270	1.105	0.056
SEX	-0.508	0.155	-0.108
FXPHH	0.48	0.415	0.108
FARMSIZE	1.406	4.586	0.044**
INCOME	0.087	3.836	0.004*
LDSHP	-0.526	0 .745	0.124
IRRIG	0.381	0.345	0.094
LSTR	-2.559	9.529	-0.05***
CREDIT	0.949	0.559	0.235

Model-Chi-Square value = 38.980***; -2 Log Likelihood = 80.750; Overall Correctly Predicted (%) = 80.6; Correctly Predicted willing group (%) = 82; Correctly Predicted non-willing group (%) 78.1; Sample size = 134. **Source:** Model Output. *** Significant at 1%, ** significant at 5%, and * significant at 10% probability levels.

Interpretation of significant variables

Listening to the radio (LSTR)

Contrary to our expectation, this variable was inversely related with willingness to pay, and found to be statistically significant at 1% probability level. The result of the Logit Model showed that listening to the radio decreases the probability of farmers' willingness to pay for extension services. Based on the model result, holding all other factors constant, the probability of WTP was 5% lower for farmers who had radio and listened to programs related to agricultural information than those who had not. The rationale behind this fact rests perhaps on the actuality that those farmers who use mass media/radio as information source may feel that they are satisfied enough and demand less for other alternative information sources which provide information on fee-for-services basis. The result of this study contradicts with the findings of the research undertaken in Kenya by Gautam (2000).

Farm size (FARMS)

As hypothesized earlier, the size of farmland in the study area was found to be directly and significantly related (at less than 5% probability levels) with the willingness to pay for advisory services. As the farm size increases, the probability of the willingness to pay for extension services also increases as farmers would tend to be commercial oriented due to large farm sizes. Keeping the influences of other factors constant, the probability of willingness to pay for extension services increased by a factor of 0.044 as land holding size increases by one hectare. The findings of the survey agree with studies undertaken by Horna et al. (2005) and Oladele (2008) who reported that farm size significantly affect the demand for private fee-for-service extension in Kenya and Nigeria respectively.

Age of household heads (AGEHH)

The analysis shows that younger farmers were 1.6% more likely to pay for advisory services in comparison to older farmers. This characteristic of the respondents is negatively related with attitude toward willingness to pay for advisory service as hypothesized and it was found to significantly influence WTP for extension services at less than 10% probability levels. The result is consistent with many empirical works (Oladele, 2008; Gautam, 2000; Alexopoulos et al., 2008). This could be as a result of the fact that older farmers may mislay initiatives to bring changes into their farms. If change is not required there is no need for extension. There is no demand for new information delivered by public sector let alone on payment basis.

Family size of the household heads (FAMS)

This variable was significantly inversely related with WTP at less than 10% probability levels. The result was

opposite with prior-expectation. Negative sign implies that small size households were better in WTP than larger households. As the family size increases by one person, the probability of willingness to pay for extension services decreases by a factor of 0.015 keeping other factors constant. This may be tied with capability of farmers to pay. As household size increased, the farmer may face fear to feed his family. This can create negative attitudes towards willingness to pay for advisory services. The farmer may only be crowded with how to feed the families, as such be less commercially oriented. However, the result of this survey contradicts with the research findings of Horna et al. (2005).

Household income (INCOME)

It can be deduced from the output of the model that the farmers who had better income position had more willingness to pay for extension services. The estimated marginal effect for this variable indicates that keeping the influences of other factors aside, the decision in favor of willingness to pay for extension services increases by a factor of 0.004 as farm income increases by thousand Birr. In other words, as the weighted farm income increases, the probability of the willingness to pay for agricultural extension services increases.

Households at higher income levels are willing to pay for extension services since the budget constraint becomes less stringent and the households can afford it. Thus, how much the households are willing to pay would depend in a significant manner on the level of the household's income. The result of this study is in line with prior expectation. It is also consistent with the findings of many other studies conducted in different parts of the world. Oladele (2008) and Alexopoulos et al. (2008) in their studies mentioned income level as an important factor for willingness to pay for commercial oriented extension in Nigeria and Greece respectively.

CONCLUSIONS AND RECOMMENDATIONS

Extension services in Ethiopia have been traditionally funded through public funds available from the government and donors. However, the changing situation of agriculture, ineffectiveness to meet the needs of farmers and deficiency of budget is putting pressure on current extension services. Thus, agricultural extension system of the country should undergo rapid reform to reply to these changing and huge responsibilities given to it, because in commercial oriented agriculture, extension needs more investment.

There is common understanding that we cannot survive only with free of charge extension services which are mainly owned by the government sector in commercial oriented agriculture. In a developing country like Ethiopia, complete withdrawal of public sector extension service is not justifiable. The point of discussion should be how to achieve more sustainability by combining financial resources and competencies of various players such as: producers, private enterprises, local organization (cooperatives), etc. Commercialization of agricultural extension is only possible if the farmers are willing to pay for extension services. The primary research question of this study was to empirically analyze factors determining farmers' willingness to pay for agricultural extension services.

The econometric analysis of this study has revealed the issue of age having an inverse and significant relationship with willingness to pay for extension services. Thus, to ensure financial sustainability of extension service, young farmers should be targeted if it is planned to get into the market. Equally important care should be taken so that older farmers will not be marginalized from extension services.

Household income and farm size, and household size have an influence on how much they would be willing to spend on extension services. By targeting farmers, with high level of incomes, large farm sizes, and household with small family size, the commercialization of extension services would take the advantages of these features and hence their greater abilities to pay for extension services. It is also an important alarm that visionary policy frame work should be designed to increase the level of income of farmers to create farmers' paying group. Again great attention should be taken to equally address poor household with large family, and household with small land holders.

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