academicJournals

Vol.5(4), pp. 70-76, May 2013
DOI: 10.5897/JAERD12.119
ISSN 2141-2170 ©2013 Academic Journals
http://www.academicjournals.org/JAERD

Journal of Agricultural Extension and Rural Development

Full Length Research Paper

Examining the effect of grower demographic and personal characteristics on willingness to pay amounts per information delivery modes in Rwanda

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Accepted 20 March, 2013

Growers' demographical and personal characteristics in regards to willingness to pay (WTP) per information delivery mode may have strong influence on the success and viability of privatized extension services. The purpose of this study was to examine the effect of growers' demographic and personal characteristics on their WTP amounts per information delivery mode in the Abahuzamugambi Coffee Growers Cooperative in Butare, Rwanda. Using a traditional questionnaire, we employed a purposeful sampling technique and 306 farmers participated in the study. Through comparative analysis, statistically significant differences were discovered in farmers' WTP amounts per agricultural information delivery modes based on gender, years of service, and total non-farm expenses. Additional research should be conducted to understand better why these differences exist.

Key words: Willingness to pay, delivery modes, extension, Rwanda.

INTRODUCTION

Agriculture in Rwanda remains largely smallholder driven and continues to face extreme land fragmentation, diminishing land resources, and low agricultural productivity (Antonites and Haguma, 2011; Government of Rwanda, 2009). Additionally, due to its landlocked nature and inconsistent transportation policies, the exporting of goods remains a major hurdle while the local market (which shrank due to the war in the early 1990s) remains stagnant. To combat these issues, the Government of Rwanda's (GOR) agricultural strategy has focused on implementing a market-based system by increasing rural incomes, enhancing food security, and converting agriculture into a sustainable sector (GOR, 2009). The attainment of this strategy is partly dependent on the evolution of vibrant and effective agribusinesses capable of adding value to farm products. A market-based agriculture system in which public and private small and medium size enterprise (SME) agribusinesses prosper, remains a priority area. By enhancing agricultural productivity and preventing food insecurity, SMEs can contribute greatly to environmental sustainability along with increasing gross domestic

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product and reducing the trade deficit (Cantore, 2011). Antonites and Haguma (2011) also report that SME's can contribute greatly to the alleviation of poverty and create jobs when the agricultural sector forms a big component of the country's economy.

Consistent with this need, the government has targeted efficient information processing, delivery, and training of SMEs as critical components of its strategy. As Rivera (2000) noted, the commodification of agricultural information has begun to revolutionize both the public sector extension and the business of private sector technology transfer. Swanson and Samy (2002) observed that the role of public sector extension in developing countries has changed substantially over the past three decades. Historically, many developing country governments assumed responsibility for providing farmers with new technology, farm inputs, supplies, and agricultural services. However, national governments and international donors have reduced their investment in public sector institutions, including extension (Adejo et al., 2012; Farinde and Atteh, 2009). As a result, extension programs in most countries have deteriorated resulting in the privatization of extension service delivery which consequently, has fueled the increase of WTP services for agricultural services.

Impact of willingness to pay

Based on previous literature, WTP has been defined as a sacrificial amount of income used to sustain or increase agricultural productivity (Holden and Shiferaw, 2002). This disposal of income for information delivery has often been the only option for residents and farmers in undeveloped countries. In previous studies concerning WTP programs, researchers discovered that WTP depends on the content of the information and if the paid-for service would (1) be greater than the preexisting information available for their particular needs (Singh and Narain, 2008); (2) involve information regarding certain plant species (Hanchinal et al., 2000); and (3) increase their farm income (Farinde and Atteh, 2009). In regards to demographical characteristics and WTP, Oladele (2008) reported an inverse relationship with female farmers and WTP for extension services. The researcher also discovered that those farmers who had longer farming experience were more likely to pay for extension services. Alexopoulos et al. (2009) discover that farmers with higher incomes, computer literate and possessing newer equipment held more positive attitudes toward WTP services.

Case for Rwanda's Abahuzamugambi coffee growers cooperative

In Rwanda, a number of private and public organizations are involved in programs that promote the formation and growth of agribusiness cooperatives in terms of training and information delivery using various modes. The coffee industry in Rwanda has factored in the country's economic development largely in part to its status as a top export and major source of foreign exchange income (Boudreaux, 2007). The Abahuzamugambi Coffee Growers Cooperative is one of the estimated fifty existing SME agribusinesses in Rwanda and is organized through an eight-person board, three-person committee, three-person control committee, and farmer's general assembly comprising of 1800 members (Kedrock and Weis, 2000; Sinclair, 2012). The cooperative collects cherries from trees at 1750ml and, as a whole, produces nearly three containers of coffee each year, much of which is purchased by Union Hand Roasted, a United Kingdom roaster based in London (Sinclair, 2012). The survival of these SMEs and their contribution to addressing the problem of poverty in Rwanda is directly tied to the availability of sufficient and appropriate agricultural information modes to increase production, promote operational efficiency, and improve managerial decision-making. With the decline in government expenditures, public extension systems are not able to provide adequate educational and technical extension programs for all farmers consequently, creating a need for farmers to pay for certain services. This study seeks to identify those factors. The selected personal and demographical characteristics chosen for this study accurately represent the most important factors in determining WTP services in Rwanda (Haba, 2004). Whereas much of the demographical and personal data collected in previous studies have focused on highlighting informational content, this study aims to determine if these individual factors affect the WTP amounts per delivery mode. Although WTP for a given agricultural service is dependent upon the knowledge (function) of that service (Aryal et al., 2009), significant attention should also be given to the mode through which the service is received.

Purpose and objectives

This study sought to determine the effect of farmers' demographical and personal characteristics on their WTP per agricultural information delivery mode. Based on consulted literature, the following hypothesis was developed to be tested *a priori* at the .05 level.

Null hypothesis

Ho_1: No difference existed in participants WTP amounts per agricultural information delivery mode in the presence of any of the following demographical and personal variables: Age, gender, education level, years in the cooperative, number of dependents, or total yearly

expenses.

METHODS

Survey research methods were utilized to explore and describe the characteristics of population in this study. The target population consisted of all farmers of the Abahuzamugambi Coffee Growers Cooperative (N = 1,500). Due to population size and cost limitations of the research, a census study was not conducted. Therefore, in accordance with the recommendations of Krejcie and Morgan (1970), a sample size of 306 farmers was purposively selected among 15 sectors of the Rwandan Southern Province. The questionnaire was based on previous work concerning willingness-to-pay studies in developing countries (Blaine et al., 2003; Umberger et al., 2002). The items in the questionnaire were modified slightly to meet the objectives of the study. Part one consisted of six items designed to collect demographical and personal information on respondents. Part two consisted of five open-ended questions designed to gauge participants' WTP amounts per service received on the five agricultural information delivery modes as identified by the Abahuzamugambi Coffee Growers Cooperative (Haba, 2004). The information delivery modes were: Extension agent visits, radio broadcast, television programming, printed publications, and farmer-to-farmer exchange meetings. Pay amounts were based on the Rwanda Franc (Frw) currency. Face and content validity were established through an expert panel with expertise in international studies and information delivery technologies. Construct validity was measured from a pilot test of randomly selected group of cooperative members not included in the final survey population. Both groups provided input regarding the content and direction of the statements, which added to the precision and correct construction of the questionnaire. Questionnaires were coded to trace responses to participants and to record responses effectively. Demographic and personal characteristics were assessed using means, frequencies, and standard deviations. Hypothesis testing was conducted using independent samples t-test and analysis of variance (ANOVA). Analysis of variance was used to compare various subjects (independent variables) on scaled variables (dependent variables). If ANOVA was statistically significant, Tukey-Kramer post-hoc means test was used to determine which of the group means were different. Additionally, effect sizes were calculated, interpreted, and reported (Cohen, 1988).

A face-to face survey was conducted. This technique was considered appropriate for this study because it increased the likelihood that people in the sample would agree to respond by the interviewer explaining to them the importance of the survey and assuring them of its confidentiality. Face-face surveys also gave the survey a human face and allowed the interviewer the opportunity to make questions easier and less threatening by using visual aids (Salant and Dillman, 1994). The nature of the study required the participants to reveal information about some personal variables, which could be sensitive to some people. This technique was particularly appropriate because it helped the researcher to assure the participants of confidentiality on potentially sensitive issues.

RESULTS AND DISCUSSION

Due to purposeful sampling, 306 (100%) farmers completed the questionnaire. The data was analyzed for normalcy and deemed usable. Demographic and personal information of the respondents was collected.

The gender makeup of respondents were split even (50%). Twenty percent of respondents were between 42 and 47 years of age. Just over one-fourth of participants (26.7%) indicated that average yearly expenses (excluding farming expenses) were between 30,001 and 40,000 Francs per year. Ninety-four (30.7%) respondents indicated having between 4 and 5 dependents followed by 72 respondents (23.5%) indicating having between 2 and 3 dependents. The majority (64.7%) of respondents indicated that they had a primary school education while the second prevailing percentage (32.3%) indicated that they had no formal education. Nine (2.9%) respondent indicated to have a secondary school education. When asked to indicated their time in the Abahuzamugambi Coffee Growers Cooperative, slightly over half of the respondents (51%) had less than 2 years of membership while only 19 respondents (6.2%) had four or more years in the Cooperative.

Null hypothesis one was tested using a combination of independent samples t-test and the ANOVA procedure. Demographical and personal characteristics in which a statistically significant difference existed ($p<0.05$) are discussed. However, in order to provide readers with an aggregate understanding of the research, all pay per mean amounts among the statistically significant variables are reported.

Gender

The t-test procedure was used to determine if differences existed in the selected agricultural information delivery technology preference by gender of participants. Results show a statistically significant difference among gender, $t(304) = 3.201$, $p<0.05$, $r = .36$ (Table 1).

Years of service in cooperative

A one –way ANOVA was used to compare participants' WTP amount by years of service in the Abahuzamugambi Coffee Growers Cooperative. Table 2 indicates that a statistically significant difference existed among participants, $F(3.302) = 2.57$ $p<0.05$, $r = .17$. A Tukey-Kramer post-hoc analysis showed that farmers in the cooperative for two years were willing to pay more for farmer-to-farmer delivery modes (M = 228.90, SD = 194.90) than those farmers who had been in the cooperative for more than three years (M = 128.60, SD = 110.30).

Yearly expenses

A one –way ANOVA was used to compare participants' WTP by their average yearly non-farm expenses. Non-farm expenses were described as all living expenditures not related to managing and sustaining the grower's

Table 1. Comparison of willingness to pay amounts per delivery mode by gender.

Delivery mode	*n*	*M*[a]	*SD*	*t*	*p*	*Cohen's d*
Agent visits						
Female	153	₣101.00	119.90			
Male	153	₣158.90	192.60			
Radio						
Female	153	₣138.50	202.20	3.201	0.05*	0.36
Male	153	₣170.10	172.10			
Television						
Female	153	₣94.40	138.80	3.526	0.05*	0.40
Male	153	₣160.50	186.70			
Printed publications						
Female	153	₣109.40	131.50			
Male	153	₣137.20	158.80			
Farmer-to-farmer exchange						
Female	153	₣205.40	168.20			
Male	153	₣184.00	167.80			

n = 306. *$p<0.05$. [a] = Amount based on per service received.

Table 2. Comparison of willingness to pay amounts per delivery mode by years in cooperative.

Years in cooperative	*n*	*M*[a]	*SD*	*F*	*p*	*Cohen's d*
Agent visits						
<1	155	₣148.60	200.14			
2	90	₣156.42	172.71			
3	42	₣166.90	147.63			
≥ 4	19	₣163.23	240.33			
Radio						
< 1	155	₣117.21	143.80			
2	90	₣154.42	194.30			
3	42	₣126.20	165.71			
≥4	19	₣126.82	134.90			
Television						
< 1	155	₣137.60	170.23			
2	90	₣123.14	171.04			
3	42	₣113.14	181.22			
≥ 4	19	₣97.40	75.62			
Printed publications						
< 1	155	₣131.71	145.40			
2	90	₣133.50	162.10			
3	42	₣84.14	126.21			
≥ 4	19	₣97.94	95.24			
Farmer-to-farmer exchange						
< 1	155	₣180.40	155.71			
2	90	₣228.90	194.93	2.573	0.05*	.17
3	42	₣204.81	159.61			
≥ 4	19	₣134.21	114.41			

n = 306. *$p<.05$. [a] = Mean amount based on per service received.

farming operations. Table 3 indicates that a statistically significant difference existed among participants, $F(5, 300) = 3.00$, $p < 0.05$, $r = .22$. A Tukey-Kramer post-hoc analysis showed that participants whose expenses

Table 3. ANOVA table of willingness to pay amount per delivery modesby average yearly non-farm expenses.

Yearly non-farm expenses	*n*	*M*[a]	*SD*	*F*	*p*	*Cohen's d*
Agent visits						
< 10000	57	₣173.92	242.40			
10001 - 20000	31	₣112.91	118.30			
20001 - 30000	59	₣147.03	182.23			
30001 - 40000	82	₣185.51	181.53			
40001 - 50000	43	₣124.91	134.50			
< 50000	34	₣134.10	215.03			
Radio						
< 10000	57	₣110.90	118.91			
10001 - 20000	31	₣224.20	220.61			
20001 - 30000	59	₣113.70	153.54			
30001 - 40000	82	₣144.50	169.13	3.002	0.01**	0.22
40001 - 50000	43	₣97.40	133.11			
> 50000	34	₣110.03	175.14			
Television						
< 10000	57	₣96.72	131.70			
10001 - 20000	31	₣174.84	250.70			
20001 - 30000	59	₣130.21	176.12			
30001 - 40000	82	₣156.61	168.42			
40001 - 50000	43	₣91.21	123.12			
> 50000	-	-	-			
Printed publications						
< 10000	57	₣123.53	132.71			
10001 - 20000	31	₣109.02	102.11			
20001 - 30000	59	₣115.62	140.84			
30001 - 40000	82	₣164.51	185.84			
40001 - 50000	43	₣80.22	86.72			
> 50000	34	₣104.72	145.41			
Farmer-to-farmer exchange						
< 10000	57	₣227.20	180.02			
10001 - 20000	31	₣200.01	172.22			
20001 - 30000	59	₣151.51	115.92			
30001 - 40000	82	₣208.21	189.90			
40001 - 50000	43	₣167.92	139.40			
> 50000	34	₣211.81	187.82			

n = 306. ***p*<.01. [a] = Mean amount based on per service received.

ranged from 30,001 to 40,000 (RFW) were willing to pay more (*M* = 144.56, *SD* = 169.10) for radio informational exchange than those participants who whose expenses were less than Frw 10,000 (*M* = 110.90, *SD* = 118.90).

CONCLUSIONS AND RECOMMENDATIONS

Although farmers not participating in this study may share similar perceptions, caution must be exercised when generalizing the results of this study. Because of statistically significant differences found between the demographical and personal characteristics, the null hypothesis was rejected.

Results of the study reveal that gender was a statistically significant demographic variable for participants' WTP amounts per information delivery mode. This finding suggests that male growers were willing to invest more funds toward acquiring additional information for the improvement of their crop. This finding supports previous research concerning gender differences in WTP opportunities whereby women were less likely to pay for extension services than their male counterparts (Oladele, 2008). One implication for this could be the fact that women have oftentimes been ostracized in acquiring new knowledge through traditional

exchanges thus preferring more non-traditional opportunities (Gidarakou et al., 2008; Trauger et al., 2010). To strengthen this case, mean scores indicated that women were willing to pay more (₣205.40 to ₣184.00) on farmer-to-farmer exchanges than any other type of information delivery modes available. This finding (although not statically significant) supports previous conclusions by Trauger et al. (2008) which indicated that women farmers do feel marginalized by the traditional "canned" (that is , lecture-style, one-way direction of information dissemination) exchanges that have been the predominant mode of informational delivery. Additional exploration as to why these differences exist should be examined specifically by WTP service providers who seek to improve and sustain privatized extension services across both genders.

Years of service was found to show a statistically significant difference in participants' WTP forfarmer-to-farmer informational delivery exchange. One implication of this finding is that after a few years into the cooperative, farmers are discovering alternative (albeit less cost consuming) means to crop production, thus allocating fewer funds toward paid assistance. In addition, this finding is in agreement with previous research by Oladele (2008) which indicated an inverse relationship between experience and WTP. Although other explanations to this finding may exist, the fact that WTP is influenced by farmers' expectation to gain knowledge and innovation (Charatsari et al., 2011), should be the primary cause for further inquiry.

A statistically significant difference existed between participants whose yearly non-farm expenses were less than Frw 10,000 versus those that had yearly non-farm expenses between Frw 30,001 and 40,000 on WTP for radio information delivery. Perhaps this difference can be attributed to the amount of disposable income that those farmers with fewer non-farm expenses have. Although, this finding seems to make sense, (that is, the fewer funds an individual has to spend on non-farm expenses, the more they will have for purchasing commercialized extension services), a further examination of the data indicates that there is no positive correlation between the two. For example, farmers whose non-farm expenses between Frw 10,001 and 20,000 allocated over 67% more funds for information delivery services than those farmers whose expenses were less than Frw 10,000. As such, additional research should focus on determining if the amount spent on commercialized extension has an effect on farm output.

Finally, the rationale behind this study was to indicate the importance of demographic and personal characteristics impact on WTP amounts per services for farmers in a large farming cooperative. Because of the success of the Abahuzamugambi Cooperative, respondents may already have a sufficient flow of information regardless of delivery mode. Further research should include non-cooperative farmers who may indicate alternative views to WTP amounts per delivery modes. Understanding the factors that have a direct impact on the amount of money farmers are willing to pay and the proper mode of delivery will provide valuable information that could be used to provide assurance of the sustainability of those services.

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