FACTORS INFLUENCING THE WILLINGNESS TO PAY FOR AGRICULTURAL INFORMATION DELIVERY TECHNOLOGIES BY COOPERATIVE-ORIENTED AGRIBUSINESSES IN RWANDA: EVIDENCE FROM THE ABAHUZAMUGAMBI COFFEE GROWERS COOPERATIVE OF MARABA-BUTARE, RWANDA

A Thesis

by

SHARON HABA

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

May 2004

Major Subject: Agricultural Education

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Alvin Larke, Jr. (Chair of Committee)	James E. Christiansen (Member)
Fred O. Boadu (Member)	Glen Shinn (Head of Department)

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ABSTRACT

Factors Influencing the Willingness to Pay for Agricultural Information Delivery Technologies by Cooperative-Oriented Agribusinesses in Rwanda: Evidence from the Abahuzamugambi Coffee Growers Cooperative of Maraba-Butare, Rwanda. (May 2004)

Sharon Haba, B.A., National University of Rwanda

Chair of Advisory Committee: Dr. Alvin Larke Jr.

This study was designed to identify the factors influencing the willingness to pay for agricultural information delivery technologies among the farmers in the Abahuzamugambi Coffee Growers Cooperative located in Butare, Rwanda. Three hundred and six farmers responded to a questionnaire that included questions about their demographic characteristics and accessibility to agricultural information technologies. Results were computed using the mean and standard deviation. T-tests and analysis of variance were conducted to determine the relationship between farmers' demographic characteristics and their willingness to pay for selected agricultural information delivery technologies.

Findings indicate that there was a correlation between farmers' willingness to pay for agricultural information delivery technologies and some of their demographic characteristics. The farmer-to-farmer delivery technology was the most preferred as reflected by the amount of money that farmers were willing to pay for it compared to expert visits, print, radio, and television. Therefore, this technology was considered to be the most compatible with farmers' needs in general.

DEDICATION

To Prince, as he goes through life’s passages.

ACKNOWLEDGEMENTS

I am indebted to so many that I cannot list of all of you here. Please know that even if your name does not appear below, I will live to cherish the memory of your kindness.

To my late father and all my family, your investment in my life has been invaluable.

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To the Partnership for Enhancing Agriculture in Rwanda through Linkages (PEARL), and the Office for International Agriculture at Texas A&M University, thank you for facilitating my program.

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CHAPTER I

INTRODUCTION

Rwanda is a small land-locked country, bordered by Uganda, Burundi, Tanzania, and the Democratic Republic of Congo (DRC). It is located in East-Central Africa. It has a surface area of 2.6 million hectares, of which only 1.4 million hectares is arable land. Current population is estimated at 8.3 million people. The country's economy is predominantly agrarian. Over 94% of the population subsists on peasant farming either directly as producers, or indirectly as agricultural wage laborers. The Agriculture sector contributes 40% to GDP, and about 90% of export revenue (World Bank, 1998).

Rwanda's economic policies since independence are said to have targeted agriculture as the main engine of economic growth. However, agricultural productivity has continued to decline over the years mainly due to population pressures, low use of inputs, and excessive state intervention in favor of coffee (World Bank, 1998). The farmers tend to be ill informed, fragmented, with low skills and limited market orientation (Kedrock and Weis, 2000).

In 1994, the decline in the agricultural sector was accelerated as a result of the civil war, genocide, and associated population movements. The already existing pre-war constraints were exacerbated and agricultural production continued to drop.

This thesis follows the style and format of the *Journal of Agricultural Education.*

Today, Rwanda's agriculture is still largely smallholder driven, and faced by extreme land fragmentation, diminishing land resources, low agricultural productivity, and a narrow export base. Its landlocked nature and inconsistent transportation policies make exports difficult. The local market for primarily agricultural goods, which shrank due to the war in early 1990s and its repercussions, remains low. The Government of Rwanda's (GOR) agricultural strategy focuses on increasing rural incomes, enhancing food security, and converting agriculture into a sustainable sector by moving it away from subsistence to a market-based system (International Monetary Fund, 2001). The attainment of this objective is partly dependent on the evolution of vibrant and effective agribusinesses capable of adding value to farm products. A market-based agriculture, with private and public sector-supported small and medium size enterprise (SME) agribusinesses remains a priority area.

Agribusiness has been defined to include all participants in a commodity vertical structure, from farm suppliers, farmers, assemblers, processors, and contributors, to ultimate domestic and international consumers. The system also includes coordinating machinery that holds it together, including markets, futures markets, contractual integration, domestic and international farm cooperatives, governmental programs, marketing boards, trade associations, voluntary agency programs, and a variety of private, cooperative, and governmental joint ventures and long-term agreements and arrangements.

The Abahuzamugambi Coffee Growers Cooperative, which is the case study, is one of the estimated fifty existing SME agribusinesses in Rwanda (Kedrock and Weis,

2000). 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 technologies to increase production, promote operational efficiency, and improve managerial decision-making.

Consistent with this need, the government has targeted efficient information processing and delivery and training of SMEs as critical components of its strategy. As Rivera (2000) noted, the commodification of agricultural information, that is to say, the transforming of knowledge into a product for sale, has begun to revolutionize both the public sector extension and the business of private sector technology transfer. Indeed, 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 technologies. This study looks at the factors influencing the willingness of farmers in an agribusiness cooperative to pay for selected agricultural information delivery technologies.

Statement of the Problem

Over the past decades, national governments and international donors have reduced their investment in public sector institutions, including extension. As a result, extension programs in most countries have deteriorated. With the decline in government expenditures, public extension systems are not able to provide adequate educational and technical extension programs for all groups of farmers (Swanson and Samy, 2002). Yet, the general consensus in the development arena is that using appropriate, research-based,

agricultural technologies is central to obtaining food security, reduced poverty, and sustainable development for developing countries. Two fundamental questions need to be answered: (1) Can farmers in developing nations still have access to agricultural information, despite the reduction in government funding? and (2) What factors determine whether or not they are willing to bridge this gap?

In specific reference to many developing nations, Mwangi (1998) pointed out that farmers differ in their socio-economic backgrounds, academic levels, learning needs and problems, priorities, and opportunities. These factors determine the means by which agricultural information technology is transferred as well as its marketability as a commodity.

This study is an attempt to determine the factors influencing the willingness of the members of a cooperative-oriented agribusinesses to pay for agricultural information delivery technologies as reflected by one cooperative, because the influence of these factors is not known.

Purpose of the Study

The overall purpose of this study is to determine the factors influencing the willingness to pay for agricultural information delivery technologies by a group of farmers in an agribusiness cooperative based on selected demographics, in order to provide a basis for more appropriate and compatible transfer of agricultural technology for small agribusinesses in Rwanda.

Objectives

Based on the purpose of the study, the following objectives were identified:

1. Identify the information delivery technologies currently available to the cooperative.

2. Identify and assess the role of the cooperative members in financially maintaining the existing technologies.

3. Determine the factors that influence the willingness of farmers to pay for selected agricultural information delivery technologies based on demographic factors.

4. Quantitatively estimate how much money the farmers are willing to pay for the selected technologies.

5. Explore options for public and private sector collaboration for agricultural information delivery technologies.

Theoretical Base for the Study

The theoretical base for this study lies in the roles of a change agent as described by Rogers (1995) in *Diffusion of Innovations.* It is theorized that one of the roles of a change agent (the seventh in the sequence) is to achieve a terminal relationship. Rogers stated that the end goal for a change agent is to develop self-renewing behavior on the part of the clients. The change agent should seek to put him or herself out of business by developing the clients' ability to be their own change agents. In other words, the change agent seeks to shift the clients from a position of reliance on the change agent to one of self-reliance. This includes among other responsibilities, that of facilitating the

technology adoption process. Adoption is defined as the decision to make full use of an innovation as the best course of action available (p.21). For it to occur, certain characteristics of the innovation itself, as well as other factors that are external to the innovation, must exist. Rogers presents five primary and four secondary characteristics of an innovation that influence its rate of adoption. The primary characteristics are its relative advantage, compatibility with existing needs, how complex it is, the degree to which it may be experimented on a limited basis (trialability), and the degree to which its results are visible to others (observability). The secondary characteristics are completeness, flexibility, readiness, and replicability. Of specific interest to this study, are the economic relative advantage and the compatibility characteristics.

Relative advantage is defined as the degree to which the technology is perceived as being better than the idea it supercedes in terms of economic profitability, social prestige, physical convenience, low initial cost, lower perceived risk, decreasing discomfort, psychological satisfaction or saving time. A cheaper technology will be adopted faster than a more expensive one (Roling, 1990). The nature of the innovation determines what specific type of relative advantage (such as economic, social, and the like) is important to adopters, although the characteristics of the potential adopters also affect which sub dimensions of relative advantage that are most important (Rogers, 1995).

Compatibility of an innovation is the degree to which an innovation is perceived as being consistent with existing values, past experiences, and needs of potential adopters. An idea that is more compatible is less uncertain to the potential adopters. Compatibility

of an innovation is perceived by members of a social system as being positively related to its rate of adoption (Rogers, 1995). Change agents must play the important, yet difficult role of diagnosing clients' needs to ensure compatibility. Specifically, the study will address one dimension of the compatibility with need aspect; that is the degree to which an innovation meets the felt need. Change agents seek to determine the needs of their clients, and then to recommend innovations that fulfill these needs. Change projects that ignore clients' needs often go awry or produce unexpected consequences. However, discovering felt needs is not a simple matter; change agents must have a high degree of empathy and rapport with their clients in order to assess their needs accurately. Informal probing in interpersonal contacts with individual clients, client advisory committees to change agencies, and surveys of clients are sometimes used to determine needs for innovations (p.228).

It is in this context that this study was conducted using the participatory action research approach to survey the participants in order to obtain potential information regarding their characteristics as technology users, which characteristics influence their technology adoption decisions.

Socioeconomic and demographic characteristics identified included age, gender, level of formal education, and socioeconomic status (Rogers, 1995, den Biggelaar, 1996, Colverson, 1995, Jiggins, 1986, and Mwangi, 1998). Additionally, feelings of mistrust, biased attitudes, and perceptions of potential adopters have also been found to influence the transfer of technology (Rogers, 1995, MacDonald & Hearle, 1984, Mwangi, 1998, den Beggelaar, 1996).

Study Hypotheses

Based on the theoretical base and objectives of the study, the following directing hypotheses were formulated.

$H_{o1:}$ An individual's age is related to the amount of money that he or she is willing to pay to pay for agricultural information delivery technologies.

$H_{02:}$ An individual's gender determines how much money he or she is willing to pay for agricultural information delivery technologies.

$H_{03:}$ Marital status determines how much money an individual is willing to pay for agricultural information delivery technologies.

$H_{04:}$ The larger the number of dependents an individual has, the less money he or she is willing to pay for agricultural information delivery technologies.

$H_{05:}$ The higher the level of education farmers have, the more money they are willing to pay for agricultural information delivery technologies.

$H_{06:}$ The greater the amount of money that farmers spend on basic necessities, the less money they are willing to pay for agricultural information delivery technologies.

$H_{07:}$ The longer the length of time one has spent as a member of the cooperative, the more money he or she is willing to pay for agricultural information delivery technologies.

$H_{08:}$ The amount of income that one derives from the agribusiness is positively related to his or her willingness to pay for agricultural information delivery technologies.

Significance of the Study

The Department of Agricultural Education at Texas A&M University is founded on six knowledge bases; Planning and Needs Assessment, Learner-Centered Instructional Design, Delivery Strategies, Evaluation and Accountability, and Research, Measurement, and Analysis. These knowledge bases are found in the following contextual applications; Leadership Education, Extension Education, Teacher Education, Distance Education, and International Agricultural Development and Education.

The International Agricultural Development and Education contextual application involves among other things, “the ongoing interface of agriculture and education and the change process of getting useful information and technology to, assessed by, and accepted or rejected by people”. It also involves consideration for participatory or bottom-up programming that values both indigenous knowledge and on-farm research, being particularly cognizant of social-cultural consequences including gender impact.

Determining the factors influencing the willingness to pay for a particular technology as opposed to another from the farmers themselves will provide further understanding of the unique factors that influence technology transfer. It will also contribute towards the participatory approach to solving development problems, which is consistent with the definition of development that the department utilizes:“ the process of transference of decision-making and power so that people themselves can ascertain their own future…of stepping from one evolutionary moment to the next; from relief to self-help to development outreach to selfhood, determination, and decision” (MacCracken, 1977).

The rationale behind Willingness-to-pay studies is that they indicate the value that individuals attach to a good or service, which in turn predicts their likely contribution to its maintenance (Boadu, 1993). By understanding the factors that have a direct impact on the amount of money that farmers are willing to pay, as described by the farmers themselves, this study will provide information that could be used to help decide the appropriate technology, and more so provide considerable assurance of its maintenance and sustainability.

Delimitations

Geographically, this study targeted the District of Maraba, Butare Province, Rwanda. The collection of data was delimited to 306 participants of approximately 1,500 people from the following 15 subdistricts: Kabuye, Shanga, Nyangazi, Bunzazi, Sovu, Gihindamuyaga, Maraba, Cyarumbo, Rusagara, Gisakura, Buremera, Kabusanza, Tare, Kibanda, and Simbi. Data were collected from June 4, 2003 through July 25, 2003.

Limitations of the Study

It is recognized that the following points are limitations to be considered in conducting and interpreting the results of the study.

First, this study was limited to the farmers in the Abahuzamugambi Coffee Growers Cooperative. Coffee is a cash crop. Consequently, some factors influencing the willingness to pay for agricultural information technologies may be unique to the particular crop that the farmers grew, and whether it is used for domestic consumption or

for export. Therefore, these factors may not necessarily be generalized to farmers involved in growing other crops.

Secondly, this study includes questions about participants' income. Some participants might consider this information to be sensitive and therefore could have reported false figures or refused to respond.

Basic Assumptions

It is assumed that the factors that determine the willingness to pay for agricultural information delivery technologies as evidenced by the participants in this study were representative of the members of other farmers' agribusiness cooperatives in Rwanda.

Based on the rationale of Willingness-to-Pay studies, is assumed that the amount of money that farmers were willing to pay for the various technologies is a reflection of how much value they attached to the particular technology. That is to say, the technology for which a larger amount was reported is the most valued, or the most preferred, and therefore most compatible with their needs.

It is assumed that the amount of coffee harvested was proportional to the income derived from it.

Definition of Terms

Endogenous knowledge- knowledge developed locally or from within, that is knowledge that is not natural, inborn or inherent (the meaning of "indigenous" given by the dictionary) (den Biggelaar, 1996).

CHAPTER II

LITERATURE REVIEW

There have been many studies conducted in the field of technology transfer from the perspective of methods, availability, management, and dissemination. Consequently, different theories have developed. This chapter will review the trend of agricultural technology transfer in developing countries. It will address factors influencing the transfer of agricultural technologies from the point of view of farmers.

The Trend of Agricultural Technology Transfer in Developing Countries

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 and supplies, as well as agricultural services. Over the past decades, national governments and international donors have reduced their investment in public sector institutions including extension. As a result, extension programs in most countries have deteriorated. With the decline in government expenditures, public extension systems are not able to provide adequate educational and technical extension programs for all groups of farmers.

Rogers (1995) defined a technology as a design for instrumental action that reduces the uncertainty in the cause-effect relationships involved in achieving a desired outcome. It usually has two components, the hardware aspect and the software aspect (p.12). The

hardware aspect consists of the tool that embodies a technology as a material or physical object. The software aspect consists of the information base for the tool. Rogers stated that the social embedding of the hardware aspects of a technology is usually less visible than its machinery or equipment, and so we often think of technology mainly in hardware terms (p.13). In this study, technology is presented as “hardware”, that is to say, as a device or method. The word ‘technology’ is often used ‘synonymously’ with “innovation” (p.12). This chapter uses the two words synonymously.

Factors Influencing Adoption of Technology

Several concepts related to the adoption of technology apply to this study. Adoption is defined as the decision to make full use of an innovation as the best course of action available (Rogers, 1995). The reverse of adoption is rejection, the decision not to adopt. The decision to adopt or to reject occurs as a process, the innovation-decision process. This process begins when individuals (or any other decision-making unit) first learns about the existence of an innovation, forming an attitude towards it, deciding to adopt or reject, to implement or use it, and finally to confirm their decision.

There are several factors that influence the decision to adopt. Some of them are characteristic of the innovation itself, while others accrue from the potential adopters.

There are five primary characteristics of an innovation that influence its adoption.

<u>Relative advantage</u>

This is the degree to which the technology is perceived as being better than the idea it supercedes in terms of economic factors such as economic profitability, social

prestige, physical convenience, low initial cost, lower perceived risk, decreasing discomfort, psychological satisfaction or saving time. A cheaper technology will be adopted faster than a more expensive one (Roling, 1990). The degree of relative advantage may be measured in economic terms, but social prestige, convenience, and satisfaction are also important factors (Rogers, 1995).

Compatibility

Mwangi (1998) noted that farmers defer in their socioeconomic backgrounds, academic levels, learning needs, and problems. Therefore, for extension personnel to be successful in technology transfer, they must understand farmers' learning needs, problems, priorities, and opportunities as well as the psychological, process, semantic, and economic barriers to adoption. This view concurs with Rogers (1995) in his discussion of the compatibility characteristic of an innovation. The compatibility of an innovation is the degree to which an innovation is perceived as being consistent with existing values, past experiences, and needs of potential adopters. An idea that is more compatible is less uncertain to the potential adopters (p. 224). Compatibility of an innovation is perceived by members of a social system as being positively related to its rate of adoption.

Rogers further pointed out that compatibility occurs in three forms, namely, compatibility with values and beliefs, compatibility with previously introduced ideas, and compatibility with needs. It is this later form that is of specific interest to this study. One dimension of compatibility with needs as a characteristic influencing adoption is the degree to which it meets a felt need. Change agents seek to determine the needs of their

clients, and then to recommend innovations that fulfill these needs. Discovering felt needs is not a simple matter, and sometimes, potential adopters may not recognize that they have a need for an innovation until they are made aware of the new idea or of its consequence (p.228). Although past research suggests that compatibility maybe be relatively less importance in predicting the rate of adoption than relative advantage, “this finding may in part be an artifact of difficulties in measuring perceived compatibility” (Rogers 1995, p. 234).

Complexity

This is the degree to which an innovation is perceived as difficult to understand and use. Some innovations are clear in their meaning to potential adopters whereas others are not. Rogers noted that although the research evidence is not conclusive, the complexity of an innovation, as perceived by members of a social system, is negatively related to its rate of adoption (p. 242).

Trialability

Trialability is the degree to which an innovation may be experimented with or tried out on a limited basis. New ideas that can be tried on the installment plan, that is in small amounts over a period of time, are generally adopted more rapidly than innovations that are not divisible. The trialability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption (p. 243).

Observability

Observability is the degree to which the results of an innovation are visible to others. The results of some ideas are easily observed and communicated while others are

difficult to observe and to describe to others. The observability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption (p.244).

However, Rogers acknowledged that there was a possible problem with measuring the five attributes presented above in that they may not in all cases be the five most important perceived characteristics for a particular set of respondents. He therefore suggested that the solution was to elicit the main attributes of innovations from the respondents as a prior step to measuring these attributes as predictors of the rate of adoption. Rogers cited a study by Kearns (1989 and 1992) that followed this procedure by eliciting twenty-five attributes of eight computer innovations among 127 suburban municipalities of Pittsburgh, Pennsylvania. The twenty-five attributes included the five primary ones (relative advantage, compatibility, complexity, trialability, and observability) along with several additional attributes, which included:

(1) completeness, which is the degree to which all components needed for successful use of the innovation are available to accompany the innovation. (2) Flexibility; the degree to which exact procedures have to be followed to guarantee success. (3) Readiness; the degree to which the innovation is ready to be used immediately, and (4) Replicability; the degree to which adopters are able to get the same results consistently. The conclusions of the study showed that the perceived twenty five attributes explained 27 percent of the variance in the rate of adoption of the eight innovations, while the five attributes (relative advantage, compatibility, complexity, trialability, and observability) explained 26 percent, only slightly less (p.210). It was presumed that the difference

occurred because the twenty-five attributes were grounded more fully in the respondents' own frames of reference. Rogers also cited other works on the attributes of innovations, but the main ones for most respondents can be described by the five primary attributes presented above.

In addition to the primary attributes of innovations that influence adoption, there are other unique factors, which have proved to have a large influence on technology adoption decisions, and consequent rate of adoption. They include:

Consultation

MacDonald & Hearle (1984) observed that consultation is a factor that can influence whether or not a technology will be adopted. They also noted that rural people mistrust outsiders and that they were likely to reject plans or technologies that are taken to them without prior consultation.

Mwangi (1998) made a similar observation in a study where a local African Inland Church (AIC) initiated an agricultural development project to address the area’s socioeconomic problems. Church elders sought advice from agricultural professionals and were supported by other community leaders from within and outside the AIC. The pastor of the church was not consulted. In a later evaluation, the evaluators found out that the pastor was unwilling to support the initiative because he considered the elders to be a clique of relatively rich, close friends who were working without consulting others. He told the evaluators that the initiative was doomed to fail.

Superior Attitude

Farmers resent advice from change agents who adopt superior attitudes (Boone, 1989). A study conducted in Keiyo Marakwet District of Kenya revealed that farmers' attitudes could influence the technology transfer process. In this particular study, a young farmer said that his extension agent, being a high school graduate like himself could not teach him anything. In this case, the farmer's superior attitude made him unteachable (Mwangi, 1998).

Superior attitude may also negatively affect technology adoption in a situation where change agents and others who introduce an innovation commit the "empty vessels fallacy" by assuming that potential adopters are blank slates who lack relevant experience with which to associate the new idea. Consequently they assume that indigenous knowledge or existing practices are so inferior that they need not be considered at all. Such superior attitude often leads to the empty vessels fallacy, and to the introduction of an innovation that is perceived as incompatible with the idea that it seeks to replace (Rogers, 1995).

Characteristics of potential adopters such as education, gender, age, ethnicity, needs, constraints, opportunities, and socioeconomic status factors do affect technology adoption decisions (Rogers, 1995, Mwangi, 1998). Therefore it is essential that a change agent take these aspects into consideration.

In this regard, previous research on adopter categories presents the "Cancian dip" which generalizes that socioeconomic status and innovativeness (the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than any

other members of a system) assume a positive linear relationship between these two variables. It is assumed that individuals adopt innovations in direct proportion to their socio-economic status; with each added unit of income, education, and other socioeconomic status variables, an individual is expected to become more innovative by an equivalent amount (Rogers, 1995). Specific socioeconomic characteristics discussed are age, number of years of formal education, level of literacy, level of social status (indicated by income, level of living, possession of wealth, occupational prestige, self-perceived identification with a social class, and the like), and size of units possessed (farms, schools, companies, and so on) (p.269).

Although the generalization that there was a positive linear relationship between socioeconomic characteristics and the degree of innovativeness was made in the context of explaining differences in adopter categories, it is relevant to this study because it highlights the fact that socioeconomic characteristics do in fact influence the adoption of innovations regardless of the rate, thus it provided a basis for the hypotheses that were formulated and tested in this study to determine the influence of socioeconomic characteristics on the willingness to pay for delivery technologies, which was a reflection of the willingness to adopt those technologies.

Other specific studies have also identified demographic factors that influence the adoption of technology. An example of such factors is gender. Jiggins (1986) observed that although women constituted a sizable and growing percentage of the agricultural workforce worldwide, women farmers were generally ignored in extension programs. Jiggins's observation is consistent with the findings of a study that analyzed rural

women's access to agricultural information in two Honduran communities, in this study, the researcher found that women lacked access to resources, which in turn influenced their ability to participate in development projects. It was found in the same study that rural women in Honduras received minimal amounts of agricultural information through a variety of sources Colverson (1995).

Endogenous Knowledge and Agricultural Technology Transfer

A study conducted on the role of endogenous knowledge in Rwanda revealed that farmers' perceptions of knowledge influenced the process of agroforestry technology generation (den Beggelaar, 1996). In Kinyarwanda, the language of Rwanda, knowledge, experience, and science are all incorporated in the word *ubumenyi*. den Begglaar noted in this study that farmers perceived knowledge from different perspectives. Some of them considered knowledge to be natural ("a gift from God"), some stated that it resulted from experience, while others suggested that it is obtained by being well informed and having gone to school. However, older farmers considered knowledge learned in school to be "artificial knowledge" as it was not applicable and useful for economic survival and social functioning in society. Regardless of the differences in perceptions of what constituted knowledge, it was concluded in the study that farmers did recognize the near absence of a mechanism of communicating knowledge as a major handicap for advancing their knowledge.

It was also concluded in the same study that in order to stimulate endogenous knowledge and technology development, there was a need to create appropriate

communication networks, thus the need for persons with both endogenous and scientific knowledge of tree species, tree cultivation, and agroforestry systems to find new methods to share detailed information with farmers throughout Rwanda in an informative, and not prescriptive, manner that treats the farmer, and her/his knowledge with respect (den Beggelaar, 1996). The place of knowledge in Rwanda is best summarized in, *"If you have knowledge, you already have food"* (Katagiri 1988).

Summary of Literature

Historically, the general practice was for developing country governments to provide agricultural information through the extension system. However, in the last three decades, national governments and international donors have reduced their investment in public sector institutions, including extension. As a result, extension programs in many countries have deteriorated. With the decline in government expenditures, public extension systems are not able to provide adequate educational and technical extension programs for all groups of farmers.

The end goal for a change agent is to develop self-renewing behavior on the part of the clients. The change agent should seek to put him or herself out of business by developing the clients' ability to be their own change agents. In other words, the change agent seeks to shift the clients from a position of reliance on the change agent to one of self-reliance. Change agents seek to determine the needs of their clients, and then to recommend innovations that fulfill these needs. These innovations should be compatible with the needs of potential farmers in order for them to be adopted. Several general

factors influencing the adoption of technologies have been compiled from previous research. Socioeconomic characteristics such as age, number of years of formal education, level of literacy, level of social status (indicated by income, level of living, possession of wealth, occupational prestige, self-perceived identification with a social class, and the like), and size of units possessed (farms, schools, companies, and so on) also influence the adoption of technology.

Other factors that are unique to change agents and potential adopters such as attitudes, and perceptions also influence the adoption of technology.

CHAPTER III

METHODOLOGY

The initial phase of this study was a comprehensive review of the literature on agricultural information technology transfer, availability, management, and dissemination as these relate to developing countries. A review of Willingness-to-Pay studies in developing countries was also done. Information from the literature served as the basis for the survey instrument that was administered to the sample population. For data collection, the study employed the participatory action research approach.

Participatory Action Research Approach

The participatory action research (PAR) approach was considered appropriate for this study to help buttress the empirical component of the study. PAR emphasizes the principles of subjectivity, involvement, and consensual validation in order to develop methods of data collection and analysis (Tandon, 1981).

The goal of PAR is improvement of lives by increasing people's awareness of their situations and facilitating structural transformation (Hall, 1981). In a study to determine the factors affecting the willingness to pay, PAR was found to be particularly appropriate because it provides an opportunity for the researcher to gain insights as to how individuals, groups, and organizations are involved in gathering information to solve their own problems (Patton, 1990). In the actual process of data collection, this

approach was very instrumental in aiding the researcher to explain to the participants the content of the survey to ensure that valid responses were given.

Selection of Population Sample

The population sample for this study was derived from the 1,500 farmers of the Abahuzamugambi Coffee Growers Cooperative. A representative sample of 306 respondents was derived by using the table *"Determining Sample Size for Research Activities"* (Krejcie and Morgan, 1970). These members were found in 15 sub districts of Maraba district; Kabuye, Shanga, Nyangazi, Bunzazi, Sovu, Gihindamuyaga, Maraba, Cyarumbo, Rusagara, Gisakura, Buremera, Kabusanza, Tare, Kibanda, and Simbi.

A current list with the last names of the farmers written in alphabetical order was provided containing names of all members and the random sampling technique was used to select respondents for this study. However, the nature of Rwandan names is that names that are given to males mainly appear in the upper section of the alphabet (mainly A through H) and then later in the alphabet (mainly S). Female names commonly begin with the letters N and M. Therefore this method had the potential to result in systematic bias. To prevent this, the study further employed the stratified sampling technique. This technique is particularly important where certain variables are of special interest to the researcher. It permits the researcher to define and include variables of special interest as sampling parameters, and helps to control for internal validity related to selection factors (Tuckman, 1999). The study included testing various hypotheses; therefore, it contains

variables that were of specific interest. This technique was instrumental in ensuring that these variables were included in the sample.

Instrumentation

The research instrument was designed based on the literature review. It was translated and administered in Kinyarwanda, the local language of Rwanda. The instrument was divided into three sections. The first section was designed to identify participants' demographics. They were asked to indicate their age, gender (male or female), marital status (married, single, widowed, divorced or separated), size of household, major source of income, alternative source of income, level of education (primary, secondary, tertiary, university, other (for example adult literacy programs), and the number of years attended at that level, and estimated yearly expenses on selected basic requirements (housing, food, school fees, clothing, medication, farm, agricultural equipment).

The second section concerned farming-related questions. The farmers were asked how long they had been members of the cooperative, what their estimated annual harvest was, which technologies were used to deliver this training, whether or not they paid for it, and if so, how much they paid.

The participants were also asked to indicate whether there was any training that they desired but did not receive. Finally, they were asked if they would be willing to pay for agricultural information delivery technologies initiated by the government and private organizations by responding yes, no, or maybe.

The third section contained bidding-like questions on five different technologies: radio, television, expert visits, print, and farmer-to-farmer. Questions were formulated in such a way that a range of 250 to 500 Rwanda Francs based on the average daily wage of a Rwandan was assigned to each technology and farmers asked to indicate how much money they would be willing to pay for the suggested delivery technologies. The questions were formulated in a detailed manner so that the participant understood the importance of the technology and made an informed decision.

Validity and Reliability

In order to ensure internal validity and control measurement error, the survey instrument was reviewed by the members of the researcher's committee for content and face validity. Some adjustments were made in the structure, chronology, and wording based on their recommendations.

The instrument was pilot-tested by a randomly selected group of farmers who were not included in the sample.

Data Collection

For accuracy and efficiency, 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 allow 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 some information about some demographic 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.

In order to make the data-collection procedure successful, support was sought through the president of the cooperative. He helped to introduce the researcher to members of the cooperative, some of whom were actually participants in the survey.

A pilot test was then conducted from a randomly selected group of cooperative members. This was done in order to ensure that the questionnaire could be easily understood. More details were added in some of the questions for purposes of clarity.

There were three categories of respondents; those who could read and write, those who could read but had no confidence to write down their responses themselves, and those who could neither read nor write. For those who could read and write, the researcher read the questions with them and then let them respond in writing. For the second category, the researcher read the questions with them and recorded the responses for them. In the third category, the researcher read the questions and used a tape recorder to record responses. Each survey questionnaire was coded (1 through 306) so as to be able to trace responses to participants, and to record responses effectively.

Data Analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS 11.0). Alpha for all statistical procedures was set a priori at .05. Effect size was calculated, interpreted, and reported. Interpretations for ANOVA were based on the Cohen Conversion: Small effect size, f = .10; medium effect size, f= .25; and large, f=.40.

The following null hypotheses were tested:

$H_{o1:}$ An individual's age is related to the amount of money that he or she is willing to pay for agricultural information delivery technologies.

$H_{02:}$ An individual's gender determines how much money he or she is willing to pay for agricultural information delivery technologies.

$H_{03:}$ Marital status determines how much money an individual is willing to pay for agricultural information delivery technologies.

$H_{04:}$ The larger the number of dependents an individual has, the less money he or she is willing to pay for agricultural information delivery technologies.

$H_{05:}$ The higher the level of education farmers have, the more money they are willing to pay for agricultural information delivery technologies.

$H_{06:}$ The greater the amount of money that farmers spend on basic necessities, the less money they are willing to pay for agricultural information delivery technologies.

$H_{07:}$ The longer the length of time one has spent a member of the cooperative, the more money he or she is willing to pay for agricultural information delivery technologies.

$H_{08:}$ The amount of income that one derives from the agribusiness is positively related to his or her willingness to pay for agricultural information delivery technologies.

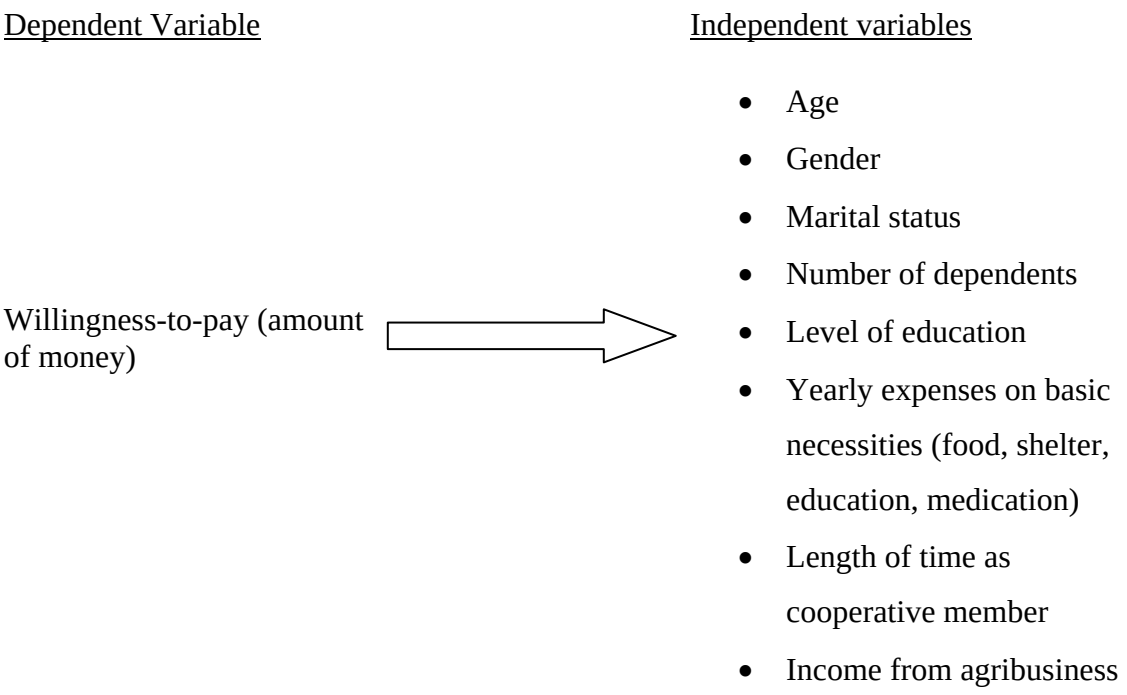

Figure 1. Summary of dependent and independent variables

CHAPTER IV

FINDINGS AND DISCUSSION

Objective 1

The first objective of this study was to identify the agricultural information delivery technologies currently available to the farmers in the cooperative.

All the technologies reported were recorded, and frequencies and percentages were calculated. As shown in Table 1, the dominant technology available to farmers in this sample was through an extension agent, while the least used was the farmer-to-farmer technology. The Table also shows an interesting source of agriculture information, the church. Majority of the Rwandan population is Christian, so it is assumed that they attend church in large numbers. It is therefore of no surprise that the church was used to pass on agricultural information to farmers.

Table 1
Information Delivery Technologies Available to Farmers in the Abahuzamugambi Coffee Growers Cooperative, Rwanda, 2003(N=306)

Technology	*N*	*%*
Extension Agent (*Animateur*)	266	86.9
Radio	89	29.1
Church	39	12.7
University Students	24	7.8
Television	22	7.2
District Agricultural Officer	18	5.9
Newspaper/Magazines	8	2.6
Seminar/workshop	6	2.0
Farmer-to-farmer	3	1.0

Objective 2

The second objective was to assess the role of the farmers in financially maintaining the existing technologies. Two questions were asked:

1. Did you, or any member of your household contribute any money to receive agricultural information using the technologies available? and

2. If so, what is the approximate amount that was paid?

As Table 2 shows, 18 (5.9%) of the respondents reported having paid some money, while 288 (94.1%) said they had not made any financial contribution.

Table 2
Farmers' Financial Contribution to Delivery Technologies, Abahuzamugambi Coffee Growers Cooperative, Rwanda, 2003

Response	*N*	*%*
Contributed	18	5.9
Did not contribute	288	94.1
Total	306	100

Objective 3

The third objective was to determine the factors that influenced the farmers' willingness to pay for agricultural information delivery technologies. The review of literature showed that differences in some demographics influence technology transfer. Therefore, eight hypotheses were formulated and tested to determine if, in fact, demographic variations did influence farmers' willingness to pay for farmer-to-farmer, expert visit, print, radio, and television as types of agricultural information delivery technologies.

$H_{o1:}$ An individual's age is related to the amount of money he or she is willing to pay for agricultural information delivery technologies.

As shown in Table 3, farmers' willingness to pay for radio did not differ according to their age, F (4,301)=1.0, p>0.05. A small effect size (f=0.12) was found.

Farmers' willingness to pay for expert visits differed significantly according to their age, F (4,301)=4.7, p>0.05. A small effect size (f=0.25) was found.

Farmers' willingness to pay for television did not differ according to their age, F (4,301)=1.2, p>0.05. A small effect size (f=0.12) was found.

Farmers' willingness to pay for print differed significantly according to their age, F (4,301)=3.5, p>0.05. A small effect size (f=0.22) was found.

Farmers' willingness to pay for the farmer-to-farmer technology differed significantly according to their age, F (4,301)=4.1, p>0.05. A small effect size (f=0.23) was found.

For all the five delivery technologies, as age increased, the willingness to pay decreased, meaning that older farmers were willing to pay less money than younger ones as shown by the mean *(M).*

Table 3
Description of the Population and Their Willingness to Pay for Agricultural Information Delivery Technologies According to Age, Abahuzamugambi Coffee Growers Cooperative, Rwanda, 2003

Age	*N*	*M*	*SD*	*F*
Radio				
<41	60	133.2	149.8	1.0
42-47	63	123.3	148.1	
48-54	60	147.0	208.6	
55-61	60	150.2	164.9	
>62	63	97.9	134.0	
Expert visit				
<41	60	105.2	136.0	4.7*
42-47	63	200.8	225.7	
48-54	60	203.8	217.3	
55-61	60	164.8	186.6	
>62	63	97.5	131.2	
Television				
<41	60	138.2	150.6	1.2
42-47	63	117.9	119.5	
48-54	60	111.0	157.3	
55-61	60	163.7	240.7	
>62	63	108.1	146.4	
Print				
<41	60	162.7	156.3	3.5*
42-47	63	138.4	127.12	
48-54	60	137.7	176.4	
55-61	60	105.1	142.2	
>62	63	74.4	108.8	
Farmer-to-farmer				
<41	60	188.0	144.1	4.1*
42-47	63	209.7	144.5	
48-54	60	248.2	201.6	
55-61	60	199.5	158.5	
>62	63	130.6	168.6	

$H_{02:}$ An individual's gender determines how much money he or she is willing to pay for agricultural information delivery technologies.

As shown in Table 4, male farmers' willingness to pay for radio differs significantly from that of female farmers, t (304) = 3.2, p>0.05. A small effect size (d=0.36) was found.

Male farmers' willingness to pay for expert visits did not differ from that of female farmers, t (304) = 1.5, p>0.05. A small effect size (d=0.17) was found.

Male farmers' willingness to pay for television differed significantly from that of female farmers, t (304) = 3.5, p>0.05. A small effect size (d=0.40) was found.

Male farmers' willingness to pay for print technology did not differ from that of female farmers, t (304) = 1.7, p>0.05. A small effect size (d=0.19) was found.

Male farmers' willingness to pay for the farmer-to-farmer technology did not differ from that of female farmers, t (304) = -0.1, p>0.05, A small effect size (d=0.13) was found.

Additionally, the mean *(M)* shows that male farmers were willing to pay more money than female farmers for radio, expert visits, television, and print delivery technologies. However, for the farmer-to-farmer technology, although there was no statistically significant difference, in reality, the mean *(M)* shows that female farmers were willing to pay more money than male farmers.

Table 4
Description of the Population and Their Willingness to Pay for Agricultural Information Delivery Technologies According to Gender, Abahuzamugambi Coffee Growers Cooperative, Rwanda, 2003

Gender	*n*	*M*	*SD*	*T*
Radio				
Male	153	158.9	192.6	3.2*
Female	153	101.0	119.9	
Expert visit				
Male	153	170.1	172.1	1.5
Female	153	138.5	202.2	
Television				
Male	153	160.5	186.7	3.5*
Female	153	94.4	138.8	
Print				
Male	153	137.2	158.3	1.7
Female	153	109.4	131.5	
Farmer-to-farmer				
Male	153	184.0	167.8	-0.1
Female	153	205.4	168.2	

$H_{03:}$ Marital status determines how much money an individual is willing to pay for agricultural information delivery technologies.

As shown in Table 5, farmers' willingness to pay for radio did not differ according to farmers' marital status, F (3,302)=1.3, p>0.05. A small effect size (f=0.11) was found.

Farmers' willingness to pay for expert visit did not differ according to farmers' marital status, F (3,302)=1.0, p>0.05. A small effect size (f=0.10) was found.

Farmers' willingness to pay for television did not differ according to farmers' marital status, F (3,302)=1.8, p>0.05. A small effect size (f=0.13) was found.

Farmers' willingness to pay for print did not differ according to farmers' marital status, F (3,302)=1.6, p>0.05. A small effect size (f=0.13) was found.

Farmers' willingness to pay for the farmer-to-farmer technology did not differ according to farmers' marital status, F (3,302)=2.1, p>0.05. A small effect size (f=0.15) was found.

Additionally, the marital status category that reported the highest mean amount (218 Rwanda Francs) was the widow category, for the farmer-to-farmer technology. This means that widows were willing to pay more money for this technology compared to the other four (radio, expert visits, television, print). It is also the only delivery technology for which farmers who are widows were willing to pay more money than married farmers among the five technologies.

Table 5
Description of the Population and Their Willingness to Pay for Agricultural Information Delivery Technologies According to Marital Status, Abahuzamugambi Coffee Growers Cooperative, Rwanda, 2003

Marital Status	*N*	*M*	*SD*	*F*
Radio				
Married	220	137.3	172.7	1.3
Single	18	80.3	112.4	
Widow	63	125.9	140.2	
Divorced or Separated	5	34.0	41.6	
Expert visit				
Married	220	151.5	176.6	1.0
Single	18	102.8	123.0	
Widow	63	182.2	238.5	
Divorced or Separated	5	112.0	132.2	
Television				
Married	220	139.7	182.4	1.8
Single	18	128.9	97.6	
Widow	63	84.8	120.5	
Divorced or Separated	5	120.0	125.5	
Print				
Married	220	134.5	150.4	1.6
Single	18	94.4	142.8	
Widow	63	97.3	131.3	

Table 5 Continued

Divorced or Separated	5	62.0	80.4	
Farmer-to-farmer				
Married	220	194.8	172.3	2.1
Single	18	152.8	143.4	
Widow	63	218.3	159.3	
Divorced or Separated	5	46.0	36.5	

$H_{04:}$ The larger the number of dependents an individual has, the less money he or she is willing to pay for agricultural information delivery technologies.

As shown in Table 6, farmers' willingness to pay for radio did not differ according to dependent number, F (4,301)=0.3, p>0.05. A small effect size (f=0.06) was found.

Farmers' willingness to pay for expert visit did not differ according to dependent number, F (4,301)=1.4, p>0.05. A small effect size (f=0.14) was found.

Farmers' willingness to pay for television did not differ according to dependent number, F (4,301)=2.0, p>0.05. A small effect size (f=0.16) was found.

Farmers' willingness to pay for print did not differ according to dependent number, F (4,301)=1.2, p>0.05. A small effect size (f=0.13) was found.

Farmers' willingness to pay for the farmer-to-farmer technology did not differ according to dependent number, F (4,301)=0.9, p>0.05. A small effect size (f=0.11) was found.

Table 6
Description of the Population and Their Willingness to Pay for Agricultural Information Delivery Technologies According to Dependent Number, Abahuzamugambi Coffee Growers Cooperative, Rwanda, 2003

Dependent number	*n*	*M*	*SD*	*F*
Radio				
0-1	40	111.3	116.8	0.3
2-3	72	134.9	168.8	
4-5	94	138.1	178.9	
6-7	61	118.1	138.3	
8-10	39	138.7	189.7	
Expert visit				
0-1	40	212.3	294.5	1.4
2-3	72	148.9	147.8	
4-5	94	156.9	198.5	
6-7	61	122.3	123.3	
8-10	39	148.7	169.3	
Television				
0-1	40	127.8	143.4	2.0
2-3	72	113.9	126.3	
4-5	94	163.1	226.2	
6-7	61	90.1	100.7	
8-10	39	124.9	165.4	
Print				
0-1	40	109.3	124.2	1.2
2-3	72	113.5	134.4	
4-5	94	150.0	173.9	
6-7	61	117.7	116.1	
8-10	39	100.5	152.7	
Farmer to Farmer				
0-1	40	195.5	207.1	0.9
2-3	72	170.3	125.0	
4-5	94	202.5	179.5	
6-7	61	187.2	143.6	
8-10	39	232.1	198.1	

$H_{05:}$ The higher the level of education farmers have, the more money they are willing to pay for agricultural information delivery technologies.

As shown in Table 7, farmers' willingness to pay for radio did not differ according to education level, F (2,303)=0.0, p>0.05. A small effect size (f=0.01) was found.

Farmers' willingness to pay for expert visits did not differ according to education level, F (2,303)=0.2, p>0.05. A small effect size (f=0.04) was found.

Farmers' willingness to pay for television did not differ according to education level, F (2,303)=0.7, p>0.05. A small effect size (f=0.07) was found.

Farmers' willingness to pay for print did not differ according to education level, F (2,303)=2.7, p>0.05. A small effect size (f=0.13) was found.

Farmers' willingness to pay for the farmer-to-farmer technology did not differ according to education level, F (2,303)=0.3, p>0.05. A small effect size (f=0.14) was found.

Table 7
Description of the Population and Their Willingness to Pay for Agricultural Information Delivery Technologies According to Education Level, Abahuzamugambi Coffee Growers Cooperative, Rwanda, 2003

Education level	*n*	*M*	*SD*	*F*
Radio				
Primary School	198	129.3	162.1	0.0
Secondary	9	118.9	164.1	
No education	99	132.2	165.5	
Expert visit				
Primary School	198	159.2	193.9	0.2
Secondary	9	150.0	175.0	
No education	99	145.0	178.7	
Television				
Primary School	198	129.3	154.9	0.7
Secondary	9	187.8	210.9	
No education	99	118.4	187.2	
Print				
Primary School	198	132.2	150.5	2.7
Secondary	9	190.0	242.2	
No education	99	99.5	121.7	
Farmer to Farmer				
Primary School	198	198.7	164.1	0.3
Secondary	9	211.1	138.7	
No education	99	185.3	178.9	

$H_{06:}$ The greater the amount of money that farmers spend on basic necessities, the less money they are willing to pay for agricultural information delivery technologies.

As shown in Table 8, farmers' willingness to pay for radio did not differ according to yearly expenses, F (5,300)=3.0, p>0.05. A small effect size (f=0.22) was found.

Farmers' willingness to pay for expert visits did not differ according to yearly expenses, F (5,300)=1.2, p>0.05. A small effect size (f=0.14) was found.

Farmers' willingness to pay for television did not differ according to yearly expenses, F (5,300)=1.9, p>0.05. A small effect size (f=0.18) was found.

Farmers' willingness to pay for print did not differ according to yearly expenses, F (5,300)=2.3, p>0.05. A small effect size (f=0.20) was found.

Farmers' willingness to pay for the farmer-to-farmer technology did not differ according to yearly expenses, F (5,300)=1.6, p>0.05. A small effect size (f=0.16) was found.

Table 8
Description of the Population and Their Willingness to Pay for Agricultural Information Delivery Technologies According to Yearly Expenses, Abahuzamugambi Coffee Growers Cooperative, Rwanda, 2003

Yearly expenses	*N*	*M*	*SD*	*F*
Radio				
<10000	57	110.9	118.9	3.0
10001-20000	31	224.2	220.6	
20001-30000	59	113.7	153.5	
30001-40000	82	144.5	169.1	
40001-50000	43	97.4	133.1	
>500000	34	110.0	175.1	
Expert visit				
<10000	57	173.9	242.4	1.2
10001-20000	31	112.9	118.3	
20001-30000	59	147.0	182.2	
30001-40000	82	185.5	181.5	
40001-50000	43	124.9	134.5	
>500000	34	134.1	215.0	
Television				
<10000	57	96.7	131.7	1.9
10001-20000	31	174.8	250.7	
20001-30000	59	130.2	176.1	
30001-40000	82	156.6	168.4	
40001-50000	43	91.2	123.1	
>500000	12	3.8	0.6	

Table 8 Continued

Print				
<10000	57	123.5	132.7	2.3
10001-20000	31	109.0	102.1	
20001-30000	59	115.6	140.8	
30001-40000	82	164.5	185.8	
40001-50000	43	80.2	86.7	
>500000	34	104.7	145.4	
Farmer-to-farmer				
<10000	57	227.2	180.0	1.6
10001-20000	31	200.0	172.2	
20001-30000	59	151.5	115.9	
30001-40000	82	208.2	189.9	
40001-50000	43	167.9	139.4	
>500000	34	211.8	187.8	

$H_{07:}$ The longer the length of time one has spent as a member of the cooperative, the more money he or she is willing to pay for agricultural information delivery technologies.

As shown in Table 9, farmers' willingness to pay for radio did not differ according to time spent in cooperative, F (3,302)=1.0, p>0.05. A small effect size (f=0.10) was found.

Farmers' willingness to pay for expert visits did not differ according to time spent in cooperative, F (3,302)=0.1, p>0.05. A small effect size (f=0.03) was found.

Farmers' willingness to pay for television did not differ according to time spent in cooperative, F (3,302)=0.6, p>0.05. A small effect size (f=0.07) was found.

Farmers' willingness to pay for print technology did not differ according to time spent in cooperative, F (3,302)=1.6, p>0.05. A small effect size (f=0.12) was found.

Farmers' willingness to pay for the farmer-to-farmer delivery technology did not differ according to time spent in cooperative, F (3,302)=2.8, p>0.05. A small effect size (f=0.17) was found.

Table 9
Description of the Population and Their Willingness to Pay for Agricultural Information Delivery Technologies According to Time Spent in Cooperative, the Abahuzamugambi Coffee Growers Cooperative, Rwanda, 2003

Time in cooperative	*n*	*M*	*SD*	*F*
Radio				
0-1	154	117.7	144.2	1.0
2	90	154.4	194.3	
3	41	128.1	167.4	
>3	21	118.6	130.0	
Expert visit				
0-1	154	149.2	201.1	0.1
2	90	156.4	172.7	
3	41	168.5	149.1	
>3	21	154.8	229.6	
Television				
0-1	154	138.2	170.7	0.6
2	90	123.1	171.0	
3	41	113.4	183.5	
>3	21	95.2	72.5	
Print				
0-1	154	131.7	145.8	1.6
2	90	133.5	162.1	
3	41	83.7	126.7	
>3	21	95.7	90.9	
Farmer-to-farmer				
0-1	154	180.4	155.9	2.8
2	90	228.9	194.9	
3	41	207.3	160.7	
>3	21	128.6	110.3	

H_{08}: The amount of income that one derives from the agribusiness is positively related to his or her willingness to pay for agricultural information delivery technologies.

As shown in Table 10, farmers' willingness to pay for expert visits did not differ according to income derived from agribusiness, F (4,301)=0.4, p>0.05. A small effect size (f=0.08) was found.

Farmers' willingness to pay for expert visits did not differ according to income derived from agribusiness, F (4,301)=2.1, p>0.05. A small effect size (f=0.17) was found.

Farmers' willingness to pay for television did not differ according to income derived from agribusiness, F (4,301)=0.9, p>0.05. A small effect size (f=0.11) was found.

Farmers' willingness to pay for print did not differ according to income from agribusiness, F (4,301)=0.4, p>0.05. A small effect size (f=0.07) was found.

Farmers' willingness to pay for the farmer-to-farmer technology did not differ according to income derived from agribusiness, F (4,301)=0.3, p>0.05. A small effect size (f=0.06) was found.

Table 10
Description of the Population and Their Willingness to Pay for Agricultural Information Delivery Technologies According to Income derived from Agribusiness, Abahuzamugambi Coffee Growers Cooperative, Rwanda, 2003

Income from agribusiness	*n*	*M*	*SD*	*F*
Radio				
0-10	57	117.5	116.3	0.4
11-100	81	145.2	176.7	
101-200	81	118.9	167.2	
201-400	58	138.8	178.7	
>400	29	124.8	160.7	
Expert visits				
0-10	57	107.5	122.1	2.1
11-100	81	174.7	233.4	
101-200	81	136.7	165.0	
201-400	58	166.1	169.2	
>400	29	215.2	231.1	
Television				
0-10	57	106.8	124.4	0.9
11-100	81	153.6	220.1	
101-200	81	118.7	142.8	
201-400	58	132.6	165.4	
>400	29	109.3	137.8	
Print				
0-10	57	127.4	139.1	0.4
11-100	81	114.2	131.1	
101-200	81	114.7	149.1	
201-400	58	141.7	168.2	
>400	29	128.3	148.1	
Farmer-to-farmer				
0-10	57	180.9	165.5	0.3
11-100	81	192.5	158.6	
101-200	81	205.6	185.5	
201-400	58	205.3	167.7	
>400	29	176.6	154.9	

Note: It is assumed that the amount of coffee harvested in kilograms is proportional to the income derived. That is to say, the more the coffee in kilograms, the more income the farmer derives from it. So the *M* value represents the amount of coffee in Kilograms.

Objective 4

The fourth objective was to quantitatively estimate how much money the farmers were willing to pay for the selected technologies. The mean value for each technology was calculated. As Table 11 shows, on average, farmers were able to pay 195 Rwanda Francs for the farmer-to-farmer technology (*SD*=168.0), 154 Rwanda Francs for expert visits (*SD*=188.1), 130 Rwanda Francs for radio (*SD*=162.7), 127 Rwanda Francs for Television (*SD*=167.5); and 123 Rwanda Francs for print as technologies for delivering agricultural information (*SD*=146.0).

Therefore the most preferred technology was the farmer-to-farmer while the least preferred was print, as reflected by the average amount of money that farmers are willing to pay.

Table 11
Mean Willingness to Pay According to Delivery Technology, the Abahuzamugambi Coffee Growers Cooperative, Rwanda, 2003

Technology	*M*	*SD*
Farmer-to-farmer	195	168.0
Expert visit	154	188.1
Radio	130	162.7
Television	127	167.5
Print	123	146.0

Objective 5

The fifth objective was to explore options for public and private sector collaboration for agricultural information delivery technologies.

The following questions were asked. Frequencies and percentages were calculated for the each of the farmers' responses.

1. Is there any agriculture related-knowledge that you desire, but you currently do not receive this knowledge?

2. If the government were to offer training programs to help you improve your returns from coffee and other crops that you grow, would you be willing to pay (financially support) for the technology/method that would be used in these programs? The response options were Yes, no, or maybe.

3. If a private organization or individual was to offer training programs to help you improve your returns from coffee and other crops that you grow, would you be willing to pay (financially support) for the technology/method that would be used in these programs?

4. In your opinion, if private organizations or individuals were to initiate technologies to provide farmers with some agriculture related knowledge, or practice, do you think such people should be paid (financially supported)? Yes/ No.

5. In your opinion, whose responsibility do you think it should be to pay (support) them?

<u>Question 1</u>

The results show that 247 (80.7%) of the farmers desired some form of agriculture-related information, but did not currently receive that information, while 59 (19.3 %) said they did receive all of the knowledge that they desired.

Question 2

Asked whether they would be willing to contribute financially to agricultural information delivery technology initiated by the government, 133 (43.8%) of the farmers responded “maybe” they would be willing to contribute some money while 98 (32%) responded “yes” they would be willing to contribute financially, and 74 (24.2%) responded “no” meaning that they would not be willing to do so.

Question 3

As to whether they would be willing to contribute to private initiatives for agricultural information delivery, 171 (55.9%) of the farmers responded “yes” 130 (42.5 %) responded “no” they would not be willing, while 5 (1.6 %) responded “maybe” they would be willing to contribute.

Question 4

In response to whether they felt that private organizations should be paid (financially supported) for agricultural information delivery technologies, 292 (95.4%) of the farmers responded that they should, while 14 (4.6%) felt that they should not be supported financially.

Question 5

Asked whose responsibility they thought it was to offer financial support to private sector initiatives in agricultural information delivery technology development, 146

(47.7%) of the respondents felt that the government should be responsible, 86 (28.1%) said the beneficiary (farmer) should be responsible, 58 (18.9 %) said that the cooperative should pay using member contributions, and 24 (7.8%) said donors should be responsible. The results for the fifth Objective are summarized in Table 12.

Table 12
Summary of Responses for Objective 5

Participant Responses	*N*	*%*
Desired information		
Yes	247	80.7
No	59	19.3
Willing to support government delivery technology initiative		
Maybe	133	43.8
Yes	98	32
No	74	24.2
Willing to support private delivery technology initiative		
Maybe	5	1.6
Yes	171	55.9
No	130	42.5
Whether or not private initiatives should be financially supported		
Yes	292	95.4
No	14	4.6
Responsible person to financially support		
Cooperative	50	16.3
Government	146	47.4
Beneficiary (trained farmer)	86	28.1
Donors	24	7.8

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

The purpose of this study was to determine the factors influencing the willingness to pay for agricultural information delivery technologies by a group of farmers in an agribusiness cooperative based on selected demographics, in order to provide a basis for more appropriate and compatible transfer of agricultural information delivery technology for small agribusinesses in Rwanda.

Based on the purpose of the study, the following objectives were identified:

1. Identify the information delivery technologies currently available to the cooperative.

2. Identify and assess the role of the cooperative members in financially maintaining the existing technologies.

3. Determine the factors that influence the willingness of farmers to pay for selected agricultural information delivery technologies based on demographic factors.

4. Quantitatively estimate how much money farmers are willing to pay for the selected technologies.

5. Explore options for public and private sector collaboration for agricultural information delivery technologies.

The following null hypotheses were also tested:

$H_{o1:}$ An individual's age is related to the amount of money that he or she is willing to pay for agricultural information delivery technologies.

$H_{02:}$ An individual's gender determines how much money he or she is willing to pay for agricultural information delivery technologies.

$H_{03:}$ Marital status determines how much money an individual is willing to pay for agricultural information delivery technologies.

$H_{04:}$ The larger the number of dependents an individual has, the less money he or she is willing to pay for agricultural information delivery technologies.

$H_{05:}$ The higher the level of education farmers have, the more money they are willing to pay for agricultural information delivery technologies.

$H_{06:}$ The greater the amount of money that farmers spend on basic necessities, the less money they are willing to pay for agricultural information delivery technologies.

$H_{07:}$ The longer the length of time one has spent as a member of the cooperative, the more money he or she is willing to pay for agricultural information delivery technologies.

$H_{08:}$ The amount of income that one derives from the agribusiness is positively related to his or her willingness to pay for agricultural information delivery technologies.

Delimitations

Geographically, the study targeted the District of Maraba, Butare Province, Rwanda. The collection of data was delimited to 306 participants from the following 15 subdistricts: Kabuye, Shanga, Nyangazi, Bunzazi, Sovu, Gihindamuyaga, Maraba,

Cyarumbo, Rusagara, Gisakura, Buremera, Kabusanza, Tare, Kibanda, and Simbi. Data was collected from June 4, 2003 through July 25, 2003.

Summary of Methodology

The participatory action research (PAR) was used to collect the data for the study. A face-to-face survey written in Kinyarwanda (the local language of Rwanda) was administered to a randomly selected sample of 306 farmers of the Abahuzamugambi Coffee Growers Cooperative of Maraba.

In order to ensure internal validity and control measurement error, the survey instrument was reviewed by the members of the researcher's committee for content, and face validity. Some adjustments were made in the structure, chronology, and wording based on their recommendations.

The instrument was also pilot tested by a randomly selected group of farmers who were not included in the sample.

Data Collection and Analysis

Each survey questionnaire was coded (1 through 306) in order to be able to trace responses to participants, and to record responses effectively. There were three categories of respondents; those who could read and write, those who could read but had no confidence to write down their responses themselves, and those who could neither read nor write. For those who could read and write, the researcher read the questions with them and then let them respond in writing. For the second category, the researcher

read the questions with them and recorded the responses for them. In the third category, the researcher read the questions and used a tape recorder to record responses.

The data were analyzed using the Statistical Package for Social Sciences (SPSS 11.0). Alpha for all statistical procedures was set a priori at .05. Effect size was calculated, interpreted and reported. Interpretations for ANOVA were based on the Cohen Conversion: Small effect size, f = .10; medium effect size, f= .25; and large, f=.40.

Summary of Findings

The findings of the study as they correspond to the objectives of the study are summarized below.

Objective 1

The first objective was to identify the information technologies currently available to the cooperative.

By calculating the frequencies and percentages of the participants' responses to the technologies that were used to deliver agricultural information to them, the results showed that 86% of the respondents stated that they had received some form of agricultural information through an extension agent *(animateur)* while 29% got agricultural information via radio broadcasts. 12.7% said they had received agricultural information when they attended church services. 7.2% of the respondents stated that they received agricultural information via television, 5.9% said they received agricultural information from the district agricultural officer. 2.6% of the respondents received agricultural information through newspapers or magazines, 2.0% of the respondents

received agricultural information by attending seminars or workshops, and lastly 1.0% of the respondents stated that they received agricultural information from another farmer.

The results also show that 80.7% of the farmers stated that there was some form of agriculture-related information that they desired, but this information did not reach them.

Conclusion

Although there were some delivery technologies currently available to the farmers, all their information needs were not met because not all the farmers were reached. This finding is consistent the findings of den Beggelaar (1996) who concluded that Rwandan farmers did recognize the near absence of a mechanism of knowledge communication as a major handicap for advancing their knowledge. It also concurs with Swanson and Samy (2002) who noted that with the reduction of investment in public sector institutions, including extension, there was a decline in government extension programs, and public extension programs were not able to provide adequate educational and technical extension programs to all groups of farmers. Farmers in Rwanda still depended entirely on the extension service for all agricultural information delivery technology, the same way they did thirty years ago.

Recommendation

Although, in general, farmers presently did not contribute any money for the technologies currently available, majority of them acknowledged that there was some form of agriculture-related information that they desired but did not receive. However, some farmers in the study indicated that they were willing to pay some money. This means that there are some farmers who are willing to bridge the gap by making a

financial contribution to have the desired information delivered. Based on the findings of this study, therefore, it is recommended that the Agriculture Ministry of Rwanda devises mechanisms to allow farmers to pay a subsidized price for the delivery technology that would be used to reach them.

Objective 2

The second objective was to identify and assess the financial role of the cooperative members in maintaining the existing technologies. Only 18 respondents (5.9%) out of 306 mentioned that they paid some money, although when asked to give an estimate of how much they had paid, none of them stated a figure.

Conclusion

This result leads the researcher to believe that farmers generally still depended on the agricultural information technologies offered by the government through the extension system.

Recommendation

As recommended for objective one above, the government through the Ministry of Agriculture should take advantage of the willingness expressed by the farmers to contribute financially to information delivery technologies, and capitalize on this to change the status quo.

Objective 3

The third objective was to determine the factors that influenced the willingness of farmers to pay for selected agricultural information delivery technologies based on selected demographic factors. Hypotheses were formulated using eight demographic

variables: age, gender, marital status, level of education, number of dependants, length of time spent as a cooperative member, income derived from agribusiness, and yearly expenditures on basis necessities. The farmers were asked how much money they would be willing to pay for five technologies: print, expert visits, radio, television, and farmer-to-farmer.

The results show that there were statistically significant differences between older farmers and younger farmers in the amount of money that they were willing to pay for three (expert visits, print, and farmer-to-farmer) of the five delivery technologies. There were also statistically significant differences in the amount of money that female and male farmers were willing to pay. For the other variables, there were no statistically significant differences.

Additionally, demographic differences determined which technology individual farmers were likely to adopt as opposed to another. All the farmers in the sample recorded the highest amount of money for the farmer-to-farmer technology meaning that they were willing to spend more money for this technology compared to the other four. It was also the only technology for which female farmers, and the widow category in particular, recorded the highest amount of money that they were willing to spend among the five technologies. There was also a statistically significant difference in the amount of money that male and female farmers were willing to spend to pay for radio and television delivery technologies.

Conclusion

Some demographic differences influenced the trend of information delivery technology adoption. This result led the researcher to concur with Mwangi (1998). Mwangi noted with specific reference to many developing nations, that farmers differ in their socio-economic backgrounds, academic levels, learning needs and problems, priorities, and opportunities. These factors determine the means by which agricultural information technology is transferred as well as its marketability as a commodity. This study concluded that demographic differences in age, gender, and marital status actually influenced farmers' ability to pay for agricultural information technologies.

The results of the study show that older farmers were less likely to adopt agricultural information technologies compared to younger ones as reflected by the amount of money that they were willing to pay. Therefore, the null hypothesis H_{o1} was not rejected.

This result could partly be explained by the Rwandan people's perception of the concept of "knowledge" (*ubumenyi)* as discussed by den Begglaar (1996) in a study that was conducted to assess the role of endogenous knowledge in agroforestry practices in Rwanda. Rwandan people perceive knowledge as being a result of experience. Older farmers in den Begglaar's study considered knowledge learned in school to be "artificial knowledge" as it was not applicable to economic survival and social functioning in society. Historically, coffee has been part of Rwanda's tradition. It is therefore of no surprise that older farmers in the sample, who were coffee farmers were willing to pay less money for information delivery technologies because they considered themselves knowledgeable enough as a result of experience.

This attitude can also be related to the idea of superiority being a factor that can hinder technology transfer as identified by Mwangi (1998) in one study in Kenya. In this study, a young farmer said his extension agent could not teach him anything being a high school graduate like himself. This attitude made him unteachable.

The second conclusion drawn with regard to demographic variations concerned farmers' marital status. The results of the study showed that widows preferred the farmer-to-farmer delivery technology. This is the only technology for which the widow category reported the highest amount of money compared to the married, single, divorced, or separated categories. A farmer's marital status therefore affected the amount of money that they were willing to pay for a given technology. Thus, null hypothesis H_{03} was not rejected.

The reason for the widows' preference could be traced to the tradition behind agricultural practices in general, but to coffee in particular. Coffee, being a cash crop, is mainly considered a man's job. Women are generally responsible for vegetables, and other crops that are mainly for domestic consumption. This situation is not unique to Rwanda. Colverson (1995) made the same observation in two Honduran communities. However, the statistics of the Abahuzamugambi Coffee Growers Cooperative show that 70% members are women, many of whom are widows as a result of the war and genocide that took place in Rwanda in 1994. Given this background, women were forced to take over the otherwise male-dominated crop production without any training.

Recommendation

Women in general, and widows in particular, need to be given more consideration if the agribusiness sector is to progress in terms of agricultural information delivery. Although the farmer-to-farmer technology was the least used, this study revealed that it is the most compatible technology to the needs of women in general, and widows in particular. The Government of Rwanda should therefore invest more resources in training farmers for the purpose of training other farmers, especially female farmers.

Although hypothetical figures were used in this study to determine how much money male and female farmers were willing to pay, it is a clear reflection of how much value each gender category attached to the given agricultural information technologies as well as the levels of accessibility. Therefore, assumptions should not be made that the available technology reached both male and farmers equally. Surveys addressing such demographics as gender, and marital status are recommended in order to develop more compatible delivery technologies for different groups of farmers.

Given the important role that coffee plays in the economy of Rwanda, the perception that coffee is an area for men is now old fashioned and should change. As a result of the war and genocide that took place in the country in 1994, tasks that used to be performed by men have been taken over by women with little or no training and experience. Therefore the Ministry of Agriculture, local cooperatives, and other institutions involved in agricultural technology transfer should recognize this fact and develop training programs specifically designed to train female farmers.

Objective 4

The fourth objective was to estimate quantitatively the willingness of farmers to pay for selected technologies. By calculating the mean of the participant responses on how much money they were able to pay for each of the five technologies, it was found that on average, farmers were willing to pay to pay 195 Rwanda Francs for the farmer-to-farmer technology, 154 Rwanda Francs for expert visits, 130 Rwanda Francs for radio, 127 Rwanda Francs for Television, and 123 Rwanda Francs for print as technologies for delivering agricultural information.

Conclusion

Although the purpose of this study was not to conduct a typical valuation of the different technologies, the results led to the conclusion that on average, the farmer-to-farmer technology was the most valued of the five technologies because the farmers indicated that they were willing to pay more money for this technology compared to the other four. Therefore farmers were likely to invest in this technology. The preference for this approach could be partly related to its characteristics as a technology as it allows for demonstration and observation, compared to radio or print, thus fulfilling the observability attribute of a technology, an attribute that if present, would make the rate of adoption faster. This preference could also be related to the issue of mistrust. Rural people mistrust outsiders, and they were likely to reject plans, and technologies that are taken to them without prior consultation (MacDonald & Hearle,1984). The farmer-to-farmer approach minimizes this mistrust because farmers closely identify with fellow farmers in many aspects.

Recommendation

Based on the ranking of the five technologies with respect to how much money the farmers were willing to pay to pay, which is assumed to be a reflection of how much value they attach to each technology, it is recommended that more investment be directed towards the farmer-to-farmer technology. It also recommended that these preference levels be considered when making decisions about the appropriate technology to use with different groups of farmers. That is to say, the difference in rank of preference is a reflection of how compatible the different technologies were with the underlying needs and expectations of the farmers.

Objective 5

The fifth objective was to explore options for public and private sector collaboration for agricultural information delivery technologies. Frequencies and percentages of farmers' responses to the following questions were calculated:

1. Is there any agriculture related-knowledge that you desire, but you currently do not receive this knowledge?

2. If the government were to offer training programs to help you improve your returns from coffee and other crops that you grow, would you be willing to pay (financially support) for the technology/method that would be used in these programs?

3. If a private organization or individual was offer training programs to help you improve your returns from coffee and other crops that you grow, would you be willing to pay (financially support) for the technology/method that would be used in these programs?

4. In your opinion, if private organizations or individuals were to initiate delivery technologies to provide you with some agriculture related knowledge, or practice, do you think such people should be financially supported?

5. *In your opinion, whose responsibility do you think it should be to support them?*

The results show that 80.7% of the farmers desired some form of agriculture-related information, but did not currently receive this information. The results also show that 42.8% of the farmers stated that "maybe" they would be willing to contribute some money to an agricultural information delivery technology initiative by the government while 32% of the farmers responded "yes" meaning that they would be willing to contribute financially, and 24.2% responded "no" meaning that that would not be willing to contribute financially.

When asked if they would be willing to financially contribute to private initiatives for agricultural information delivery, 55.9% said that they would be willing to do so, 42.5 % said they would not be willing to contribute, and 1.6 % said that maybe they would contribute.

As to whether private organizations should be financially supported for any initiatives to deliver agricultural information to farmers, 95.4% of the farmers felt that they should. Asked who they felt should have the responsibility to financially support them, 47.7 % of the farmers said that the government should financially support such initiatives, 28.1% said the beneficiary (trained farmer) should take this responsibility, 16.3% said that cooperative through member contribution should take the responsibility,

while 7.8% (24) felt that donors should be responsible for financially supporting such initiatives.

Conclusion

Although some farmers acknowledged having received agriculture-related information from various sources, not all farmers were reached. This result is consistent with den Begglaar (1996). den Begglaar observed that farmers in Rwanda did recognize the near absence of a mechanism of knowledge communication as a major handicap for advancing their knowledge.

Recommendation

Although many farmers (47.7%) felt that the government should have the responsibility of financially supporting private sector initiatives in agricultural information delivery technology, there were some farmers who were willing to play their part as beneficiaries to make a financial contribution. This information could provide a basis for the Ministry of Agriculture to encourage both private, and public institutions located in Butare Province (location of Cooperative), such the National University of Rwanda, the National Agricultural Research Institute (ISAR), and local and international non-governmental organizations to invest in agricultural information delivery technologies in order to enhance the performance of small agribusinesses.

A policy recommendation for the Government of Rwanda, the Ministry of Agriculture in particular, is to conduct an Ability-To-Pay (ATP) study. This study identified the influence of selected demographic variables on farmers' Willingness-To-

Pay (WTP) for agricultural information delivery technologies. Hypothetical figures based on the average daily income of a Rwandan were used for the sole purpose of determining the value that farmers attached to selected delivery technologies, as reflected by how much money they were willing to pay for each one of them, which in turn was a reflection of their delivery technology preferences. An ability-To-Pay study would determine the amount of money that farmers are actually able to pay alongside their regular expenses, thus providing more tangible policy guidelines for appropriate, compatible and affordable agricultural information delivery technologies as well as assurance of their maintenance.

Need for Further Research

This study addressed the delivery technology aspect of agricultural information. Further research is recommended in order to identify the actual information or knowledge needs of farmers. Knowledge of these needs would then provide guidelines for selecting the appropriate technology.

The factors identified in this study as influencing how much money farmers were willing to pay might be unique to farmers involved in cash crop production, such as coffee or tea. Further research is recommended in order to determine whether the same factors are applicable to other farmers who produce crops for domestic consumption. The results of such research would provide guidelines for more appropriate delivery technology selection and design.

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APPENDIX

STUDY QUESTIONNAIRE

A survey to determine the factors influencing the willingness-to-pay for agricultural information delivery technologies by cooperative-oriented agribusinesses in Rwanda: Evidence from the Abahuzamugambi Coffee Growers Cooperative of Maraba, Butare, Rwanda (2003).

SECTION I. DEMOGRAPHICS

1. What is your age? ____

2. Please indicate your gender by writing "X" in the space provided.

    Male: _____

    Female: _____

3. Please indicate your marital status by writing "X" in the space provided.

    Married: _____

    Single: _____

    Widow: _____

    Divorced/Separated: _____

4. How many children/dependents do you have: ____

5. What is your major source of income (occupation)?_____

6. Do you have another source of income apart from the one mentioned in 5 above?

Yes: _____

No: _____

7. Please indicate your level of education by writing "X" in the space provided :

Primary School: _____

Secondary School: _____

Tertiary Institute: _____

University: _____

None:_____

8. Please indicate the number of years attended at the above level of education:_____

9. What is was your estimated total expenditure (in Rwandan Francs) on the following items in the last 12 months?

Item	Amount
(a) Building upkeep	_____
(b) Food	_____
(c) House furnishing	_____
(d) School fees	_____
(e) Clothing	_____
(f) Agriculture (livestock/crops)	_____
(g) Medical	_____
(h) Other	_____

SECTION II: FARMING-RELATED QUESTIONS

1. For how many years have you been a member of the Abahuzamugambi Cooperative?

_____Years

2. What is your average coffee production in Kg? _____

3. Is there any agriculture related knowledge that you desire, but you currently do not receive this knowledge?

Yes: _____

No: _____

In the space provided, please write down all methods/technologies through which you receive agricultural information?

4. Did you, or any member of your household contribute any money to receive agricultural information using these technologies?

Yes: _____

No: _____

5. If you answered “yes” to question 10 above, approximate the amount of money contributed. _____ Rwanda Francs.

6. Is there any agriculture related knowledge/information/practice that you desire, but you presently do not receive it.

Yes: _____

No: _____

7. If the government were to offer training programs to help you improve your returns from coffee and other crops that you grow, would you be willing to pay (financially support) for the technology/method that would be used in these programs?

Yes: _____

No: _____

Maybe: _____

8. If a private organization or individual was to offer training programs to help you improve your returns from coffee, as well as other crops that you grow, would you be willing to pay (financially support) for the technology/method that would be used teach you?

Yes_____

No:_____

Maybe _____

9. In your opinion, if private organizations or individuals were to initiate technologies to provide you with some agriculture related knowledge or practice, do you think such people should be paid (financially supported)?

Yes: _____

No:_____

10. In your opinion, whose responsibility do you think it should be to pay (financially support) them?

SECTION III : PAYMENT-RELATED QUESTIONS

There are several methods or technologies that can be used to deliver agricultural information to farmers. They include field visits by experts or other farmers, use of radio, television, newspapers or magazines, brochures, and others for a specified amount of money. There may be some information or practice that that you have heard of, and you know that it can help you to increase your returns from coffee or other agricultural activities that you are involved in. Such information could include knowing how to wash the coffee, when and how to prune, weed, how to dry the coffee to the required level, knowing which beans are right to pick, and when to pick them, tending to coffee in the off-season, as well as other knowledge needs that you specified in question 13 of the previous section. This knowledge can be made available to you using selected methods or technologies. You as the beneficiary would pay a fee for this service.

Please answer the following questions.

1. Would you be willing to pay Frw 250 in order to have the knowledge you need provided to you by use of radio?

Yes_____

No_____ (if no, go to question 2).

I don’t know (go to Question 5)

2. Would you be willing to pay Frw 350 in order to have the knowledge you need provided to you by use of radio?

Yes_____

No_____ (if no, go to question 3).

I don’t know (go to Question 5)

3. Would you be willing to pay Frw 450 in order to have the knowledge you need provided to you by use of radio?

Yes_____

No_____ (if no, go to question 4).

I don’t know (go to Question 5)

4. Would you be willing to pay Frw 500 in order to have the knowledge you need provided to you by use of radio?

Yes_____

No_____ (if no, go to question 5).

I don’t know (go to Question 5)

5. How much money would you be willing to pay in order to have the knowledge you need provided to you by use of radio? Frw: _____

6. Would you be willing to pay Frw 250 in order to have the knowledge you need provided to you by an expert (such as an agronomist) visiting your farm to teach you?

Yes_____

No_____ (if no, go to question 7).

I don't know (go to Question 10)

7. Would you be willing to pay Frw 350 in order to have the knowledge you need provided to you by (such as an agronomist) visiting your farm to teach you ?

Yes_____

No_____ (if no, go to question 8).

I don't know (go to Question 10)

8. Would you be willing to pay Frw 450 in order to have the knowledge you need provided to you by (such as an agronomist) visiting your farm to teach you?

Yes_____

No_____ (if no, go to question 9).

I don't know (go to Question 10)

9. Would you be willing to pay Frw 500 in order to have the knowledge you need provided to you by (such as an agronomist) visiting your farm to teach you?

Yes_____

No_____ (if no, go to question 10).

I don’t know (go to Question 10)

10. How much money would you be willing to pay in order to have the knowledge you need provided to you by (such as an agronomist) visiting your farm to teach you?

Frw: _____

11. Would you be willing to pay Frw 250 in order to have the knowledge you need provided to you by use of television?

Yes_____

No_____ (if no, go to question 12).

I don’t know (go to Question 15)

12. Would you be willing to pay Frw 350 in order to have the knowledge you need provided to you by use of television?

Yes_____

No_____ (if no, go to question 13).

I don’t know (go to Question 15)

13. Would you be willing to pay Frw 450 in order to have the knowledge you need provided to you by use of television?

Yes_____

No_____ (if no, go to question 14).

I don't know (go to Question 15)

14. Would you be willing to pay Frw 500 in order to have the knowledge you need provided to you by use of television?

Yes_____

No_____ (if no, go to question15).

I don't know (go to Question 15)

15. How much money would you be willing to pay in order to have the knowledge you need provided to you by use of television?

Frw: _____

16. Would you be willing to pay Frw 250 in order to have the knowledge you need provided to you by use of print methods (newspapers/letters, brochures, magazines, etc)

Yes_____

No_____ (if no, go to question 17).

I don't know (go to Question 20)

17. Would you be willing to pay Frw 350in order to have the knowledge you need provided to you by use of print methods (newspapers/letters, brochures, magazines, etc))

Yes_____

No_____ (if no, go to question 18).

I don't know (go to Question 20)

18. Would you be willing to pay Frw 450in order to have the knowledge you need provided to you by use of print methods (newspapers/letters, brochures, magazines, etc))

Yes_____

No_____ (if no, go to question 19).

I don't know (go to Question 20)

19. Would you be willing to pay Frw 500 in order to have the knowledge you need provided to you by use of print methods (newspapers/letters, brochures, magazines, etc))

Yes_____

No_____ (if no, go to question 20).

I don't know (go to Question 20)

20. How much money would you be willing to pay in order to have the knowledge you need provided to you by use print methods (newspapers/letters, brochures, magazines, etc)?

Frw: _____

21. Would you be willing to pay Frw 250 in order to have the knowledge you need provided to you by another farmer who has this knowledge?

Yes_____

No_____ (if no, go to question 22).

I don't know (go to Question 25)

22. Would you be willing to pay Frw 350 in order to have the knowledge you need provided to you by another farmer who has this knowledge?

Yes_____

No_____ (if no, go to question 23).

I don't know (go to Question 5)

23. Would you be willing to pay Frw 450 in order to have the knowledge you need provided to you by another farmer who has this knowledge?

Yes_____

No_____ (if no, go to question 24).

I don't know (go to Question 25)

24. Would you be willing to pay Frw 500 in order to have the knowledge you need provided to you by another farmer who has this knowledge?

Yes_____

No_____ (if no, go to question 25).

I don't know (go to Question 25)

25. How much money would you be willing to pay in order to have the knowledge you need provided to you by another farmer who has this knowledge?

Frw: _____

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