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**Assessing the Determinants of Bank Savings Adoption in Developing Countries:  
An Event History Analysis Approach.**

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# **Assessing the Determinants of Bank Savings Adoption In Developing Countries: An of Event History Analysis Approach**

## **Abstract**

The authors examine key marketing problems associated with the use of formal financial institutions to mobilize the savings of rural consumers in developing countries. A new methodology for researching the bank-savings adoption process is introduced. The illustrative analysis on a random sample of over 2,000 rural consumers in Ghana confirms the ability of the EHA framework to provide a more parsimonious model of the bank savings adoption-diffusion process than traditional diffusion models.

## **INTRODUCTION**

Savings is of fundamental importance to economic development (e.g., Adams 1978, McKinnon 1973, Shaw 1973), and banks are considered to be the most effective intermediaries in mobilizing savings for economic development (e.g., Galbis 1977; Porter 1964; von Pischke 1983). Accordingly, policy makers and development planners in less developed countries (LDCs) such as Kenya, Malawi, Ghana and India, have set up banks and formal financial institutions for the purpose of mobilizing savings in rural areas. Furthermore, developing countries' interest in mobilizing rural savings through banks is reinforced by increasing evidence that rural households possess substantial savings capacity (Adams 1978; von Pischke 1978). Unfortunately, rural savings mobilization programs have failed (von Pischke 1978) in part because rural consumers continue to patronize informal institutions. Yet, to date, there is little empirical knowledge about the conditions that impact rural consumers' adoption of banks in less developed countries (i.e., LDCs). While considerable attention has focused on the rural savings mobilization issue, much of this attention has focused on macro-level issues, such as the role of saving in economic development, and recently, the role of marketing in economic development (e.g., Cundiff 1982; Dholakia 1981; Duhaime, McTavish, and Ross 1985). With few exceptions (Dadzie et al. 1989; Akaah et al. 1987), studies of marketing and economic development have neglected the rural savings issue. Thus, as a new concept that affects economic development, rural savings mobilization programs have not been accepted by rural consumers who make up the bulk of the population in LDCs. Acceptance of such programs would contribute to economic development of LDCs by accumulating capital for development projects and agricultural lending.

The purpose of this paper is to present a recently developed methodology in various fields of science, and to show how the new method can help development researchers and planners formulate effective savings mobilization strategies in LDCs. More specifically, the application of the methodology is illustrated in a study of bank savings adoption among rural consumers in Ghana. The adoption issues that could be addressed may be similar to those raised by earlier researchers ( e.g., technology transfer) or they can apply to products or ideas unique to a particular country. We begin with a brief review of the role of savings and financial institutions in economic development, followed by a review of the role of marketing in economic development. Next, we discuss the "event history analysis" (EHA) methodology and its applications in marketing. This is followed by the EHA analysis of savings behavior data involving rural consumers in Ghana. The final section presents a detailed discussion of the implications of results and EHA models for contemporary research on rural savings in LDCs.

## **REVIEW OF RURAL SAVINGS MOBILIZATION RESEARCH AND HYPOTHESES**

Research on rural savings mobilization has been conducted in two streams: 1) the role of banks in economic development, and 2) the influence of marketing on savings behavior. Although both streams do not directly address the bank-adoption process by rural consumers, they suggest the broader environmental characteristics of LDCs which could be used as covariates of rural consumers' adoption process. These characteristics are briefly reviewed in the paragraphs that follow.

### **The Role of Banks in Economic Development**

Banks and other formal financial institutions are considered to be more effective and desirable intermediaries for mobilizing rural savings because they are believed to play certain crucial roles in economic development. Studies have shown that banks can integrate the rural economy into the cash economy, thus enabling planners to exercise stronger controls over rural economies. In addition, banks act as agents for channeling funds from low-yield to high-yield investments (e.g., Galbis 1977). Furthermore, studies show that as the number of banks increases, voluntary savings also increase (Porter 1964).

Despite their potential roles, banks are generally a "Western " phenomenon to most rural consumers who are more familiar with informal financial institutions such as money lenders, pawn-brokers, savings associations, relatives and friends. In contrast, banks require customers to know how to read and write. The use of some

financial services such as checks may be completely foreign to many rural consumers. In addition, studies have shown that rural consumers face three types of barriers in using banks (Dadzie, Akaah and Dunson 1989). First, banks are frequently concentrated in the urban areas of LDCs so that rural consumers find it quite inconvenient to use them. Second, banks frequently can not meet the liquidity needs of many LDC consumers (Morris and Adams 1994), not to mention the inconvenient hours for the farm population of rural consumers (Miracle, Miracle and Cohen 1980). Finally, savings mobilization research in the economic development literature suggests that traditional incentives in the form of financial rewards (i.e., interest on deposits) are likely to deter the use of financial services because of high inflation rates in many LDCs economies (e.g., Dadzie, Akaah and Dunson 1989; Miracle, Miracle, and Cohen 1980). Thus, the nominal interest rates on deposits would not be an adequate incentive to savers.

In summary, the impact of these macro variables on rural consumer's adoption of banks and financial services has not been previously examined in the context of LDCs. With respect to rural consumer's adoption of banks for savings and investment services, it is posited that these factors may provide insights into the adoption process.

### **The Role of Marketing in Rural Savings Mobilization**

As observed above, many of the barriers that face planners in introducing banks into rural areas of LDCs are marketing-related. The introduction of banks to a largely illiterate rural population involves market-development strategies regarding segmentation and positioning in order to accelerate the adoption of banks in rural societies. However, traditional marketing studies have ignored the rural savings mobilization issue. One recent example of such studies investigating the rural savings issues is the study by Dadzie, Akaah and Dunson (1989). Specifically, this study examined the impact of a new savings mobilization program for rural consumers in Ghana developed along conventional marketing planning principles. Policy makers defined target market based on preliminary studies of rural consumers' needs and selected cocoa farmers as the segment of the population with the highest number of potential adopters. Product and services were designed to reflect the different needs of farmers and many of the marketing barriers. Not surprisingly, farmers' reactions to the "farmers bank" concept was overwhelmingly supportive. One limitation to the Dadzie, Akaah and Dunson study is that it did not specifically examine the adoption process. Like most existing aggregate diffusion studies, the authors assumed

that all rural consumers would eventually adopt the "farmers bank" concept. No distinction was made between the timing versus the probability of its adoption. Thus, the impact of marketing factors on the adoption process is yet to be systematically examined within the diffusion framework. This paper is an attempt to expand the marketing literature on diffusion of innovations with respect to the rural savings mobilization issue. It is posited that among rural LDC farmers, marketing factors would enhance the adoption decision but not the probability of adoption, given the inconvenience associated with bank savings patronage.

### THE EVENT HISTORY ANALYSIS FRAMEWORK

Early sociologists (e.g., Robert K. Merton) argued that the relationship between data and theory is necessarily dialectic. Data and empirical research affect the process of theory construction and validation, including "the serendipitous pattern in which unanticipated results influence theory and the cumulative processes by which the new data and procedures lead to the recasting of theory, the refocusing of interests, and the clarification of concepts" (Campbell and O'Rand 1988, p.59).

During the past ten years, newly developed models have been contributing to researchers' ability to study various phenomena in a dynamic context. These models, collectively known as event history analysis (EHA) have helped scientists detect patterns of variation over time and disentangle forces occurring on different levels of aggregation (e.g. individual, family, culture, cohort, country), as well as in distinguishing between different time dimensions such as exposure to an event (e.g., innovation), duration in a given state (e.g., length of awareness of an innovation), exposure to a social situation (e.g., type of government) and historical eras (e.g., Mayer and Tuma 1990).

EHA refers to "various statistical methods for examining shifts between successive states (or categories) within some continuous interval of time on the basis of a complete temporal record for some sample" (Mayer and Tumu 1990 p.3). Yamaguchi (1991) defines EHA "either as the analysis of duration for the occurrence of an event during the risk period or as the analysis of rates of the occurrence of an event during the risk period" (p.3). EHA addresses the question of: (a) how much time ensues before an event occurs, (b) the rate at which an event occurs with respect to time, (c) whether the rate changes with time, and (d) whether different subgroups of a population might show variation in relationship of the rate to time. EHA models can address the dynamics of discrete as well as continuous change by relating the rate of transition to time as well as to variables (Campbell

and O'Rand 1988). When the life event, change or transition at any given instant depends on how long the individual has already been in that state, the change can be modeled as a probability in the rate of transition with respect to time based on how long (duration) a person has been in that state. Duration can be defined with respect to any baseline; and it can be measured with respect to some event specific to an individual (e.g., years of employment prior to retirement, adoption of a service following awareness) or events that are common to all members of a given population (e.g., economic recessions) (Campbell and O'Rand 1988).

Efforts to properly specify duration dependence in hazard models have been bolstered by the development of estimation procedures that allow changes in hazard rate while the process is under way. Recently introduced statistical software that estimates models with duration dependence specified make the study of these transitions possible. When the probability of a transition occurring does not change, the hazard rate is constant over time. In this case,  $h(t) = h$  where  $h$  is the constant hazard rate and  $t$  is time. However, several models have been developed to account for change in the hazard rate over time-- a wide variety of linear and nonlinear changes or combination of changes (e.g., Vuchinich et al. 1991). The effects of specific characteristics of members of the sample on the hazard rate can be easily added to these models by including a vector of covariates for independent variables.

### **Marketing Applications of EHA**

One finds limited applications of the EHA methodology in the field of marketing in general, and diffusion of innovations in particular. However, one major study of the diffusion of ATMs across banks has direct relevance to the study of the diffusion process across consumers in any market. Specifically, the study by Sihna and Chandrashekar (1992) used the recently developed hazard (EHA) models to overcome previous shortcomings in diffusion studies; namely, the lack of effects of marketing mix variables and other covariate effects and their theoretical justification in diffusion models. As the authors point out, although previous diffusion models have recognized the importance of consumer dynamics, they fail to recognize the complexities associated with the adoption timing and consumer heterogeneity.

Sihna and Chandrahekar (1992) build their argument for a split hazard model on the idea that some variables affect the probability of adoption; they make the case for modeling simultaneously the probability and timing of adoption, and the impact of both individual and market characteristics on both those aspects of the

diffusion process. The authors present both theoretical and empirical arguments for using EHA to study the diffusion process. Their study, although applied in the context of the diffusion of ATMs among banks, shows how the diffusion process can be studied in a dynamic context using characteristics that affect both the timing and probability of adoption. Specifically, some variables are bank-related characteristics, other variables relate to bank strategies, and other factors relate to the federal regulatory environment. Some variables may apply only to one bank, while other variables may apply to a group of banks (e.g., operation in SMSA); and other variables could apply to all banks only at a given point in time (e.g., federal regulations).

These theoretical and empirical notions can be transferred to the study of diffusion of innovations regarding consumer products and services in a given market or country.

#### **EHA IMPLICATIONS FOR RURAL SAVINGS MOBILIZATION RESEARCH**

EHA models can be used to study the adoption of both products and services by consumers and industrial firms. Since our main interest is in the adoption of financial services by ultimate consumers, the recently developed EHA methodologies provide opportunities for studying the adoption of financial services in a dynamic context. Drawing from findings of previous studies, we can classify the variables that could affect the adoption process into three categories: (a) variables unique to a given individual or household unit; (b) variables that are common to some group but not to other groups among potential adopters; and (c) variables applicable to all groups at a given point in time but not applicable at a different point in time. These variables can be modeled as covariates related to product and individual characteristics, group characteristics, activities of the organizations with respect to marketing of financial services (e.g., period of promotional campaigns), and government policy (e.g., incentives, regulation).

The split hazard model (one form of EHA) of diffusion research offers development planners more insight into the adoption of banks by rural consumers for the purpose of evaluating alternative market development strategies as explained in this section.

## Identifying Relevant Marketing Controlled Variables

One of the most challenging market-development issues facing developing country planners in mobilizing rural savings is identification of potential adopters for the effective design and delivery of banking services to rural consumers. This problem arises in part because of the "foreign" nature of banks to rural societies in LDCs. Because rural populations are unfamiliar with the banking concept, it is crucial that bank services reflect the unique needs of rural consumers as well as factors which enhance uninhibited interactions with banks. Although these unique needs are likely to vary from group to group within rural societies, traditional segmentation variables used in marketing studies seem to lack applicability in rural societies. For example, while studies show that adoption of an innovation is associated with socio-demographic variables, the relevance of such variables in predicting rural consumers' bank-saving adoption behavior is questionable. One reason is that most rural consumers are illiterate and have meager farm incomes. Thus, it will be difficult to identify the relevant segments using variables such as education and income.

Despite this problem the diffusion literature is rich in variables that could be used in identifying potential adopters of financial services in LDCs. The recent EHA model can be most useful in determining the socio-demographic variables that affect the overall probability of bank-savings adoption and those which affect the timing of bank-savings adoption by rural consumers. Variables that affect the timing but not the overall adoption probability are considered to be of lesser importance to rural consumers. Similarly, EHA can be applied in several marketing strategy issues such standardization vs. Adaptation of rural bank services, and the identification of the promotional effects of macro environmental variables used on bank savings adoption behavior among rural consumers..

## ILLUSTRATIVE ANALYSIS

### Data Sources

To demonstrate the application of EHA methodology the adoption of the bank savings habit in a developing country context, data were obtained from a recent U.S.A.I.D study of a rural savings mobilization program in Ghana. This study was a follow up to a 1983 study which examined the savings behavior of a random sample of 2123 rural consumers under a rural savings mobilization program for rural areas of Ghana. The

program involved the creation of a special farmers bank by extending the country's network of banks into the rural areas. Since approximately 50% of these rural Ghanaian farmers had no previous experience with a formal bank, the special farmers bank constitutes a unique opportunity to study the bank savings adoption/non-adoption behavior in an African context. The farmers were personally interviewed by agricultural extension officers of the Ghana Cocoa Marketing Board (Cocoa Board). Farmers were randomly selected on the basis of their towns/village from a list of towns and villages provided by the Board. Extension officers who live in sampled towns and villages were then recruited for a two day training by one of the authors. They were then given guidelines for selecting farmers at the individual level, including a simple randomization process of selecting every third farmer. This process resulted in approximately one farmer from every village/town. Interviewers were also provided a standard translation of the English version of the questionnaire in the two major local languages as a means of minimizing possible interviewer bias.

The questionnaire was adapted from the 1983 study (Dadzie, Akaah and Dunson 1989) and pretested in 10 towns prior to its administration. Table 1 presents a summary of the variables considered in the analysis while Table 2 presents a summary of selected profile of the respondents reflected in the study. The profile of the respondents confirm the apparent success of the farmers' bank system. Approximately 71 percent of the respondent had opened a bank savings account for the first time by 1995, a significant increase over the first year (1983) rate of 49 percent. In addition, respondents averaged a savings ratio of approximately 22 percent which represents a significant increase over the initial savings ratio of 15 percent (Dadzie, Akaah and Dunson 1989). A full description of the original study is provided by Dadzie and Dadzie (1995).

[INSERT TABLES 1 & 2 ABOUT HERE ]

#### STUDY VARIABLES

The following key information on respondents and the farmers' system were selected for the analyses.

- a) Data on individual characteristics including age, income, education, number of children, innovative orientation, and farm size (as proxy for wealth).
- b). Service related marketing variables including customer service expectations and service quality (speed of service, consistency of service, accuracy of service) and convenience

of service (hours of operation, days of operation, locational convenience, etc.) and attitude of bank personnel (trust, helpfulness, courtesy, understanding of banking operations, etc).

- c) Bank-benefit related marketing variables including the security of savings, interest income, savings history, etc.).

The earlier discussions show that these variables do influence bank savings in a developing country context. Furthermore, the relevance of these factors was validated in the 1983 baseline study (Dadzie, Akaah and Dunson 1989).

### ANALYSIS AND RESULTS

The EHA analysis model was first used to identify the determinants of the farmers' bank adoption decision from among the three categories of influences: 1) socio-demographic and individual factors; 2) bank-related factors; and 3) marketing factors. Next, the analysis was repeated with a logit model and basic duration (regression) model for comparison purposes. For the purpose of the logit model, adopters were defined as one if the respondent reported having opened a bank savings account at his/her designated farmers' bank since it was launched in 1982 and as zero if otherwise. For the basic duration model, DURATION was defined as how long it took an individual to open a bank savings account for the first time following the system's launch in 1982. The EHA analysis was conducted by considering the effects of covariate variables on the adoption and DURATION simultaneously, using the PHA procedure in SAS (1995).

### INDIVIDUAL CHARACTERISTICS AS BANK SAVINGS ADOPTION CORRELATES

Table 3 presents a summary of the results pertaining to the socio-demographic and individual variables. These variables include AGE, INCOME, EDUCATION, EXPERIENCE, FARM SIZE, SAVINGS RATIO, AND INNOVATIVENESS. Of the seven factors INCOME has received the most attention in LDC research (Mikesell and Zinser 1973; Snyder 1974). However, it remains to be validated in a rural consumer bank savings context. The table shows that all three models yielded significant overall estimates (EHA:2 Log L =4391.86, p,= .001; Logit: chi-sq=1321.96, p<.001; and the basic duration (regression) model: F=5.989, p,<.01). the superiority of the EHA model is reflected in the consistently lower standard errors of the parameter estimates.

However, the variables with significant influences are not identical in all three models. AGE and SAVINGS RATIO are the only significant variables in the EHA model. In the Logit and basic duration models, EDUCATION, FARM SIZE, and INCOME are significant in addition to AGE and SAVINGS RATIO. These results suggests that AGE is the most important socio-demographic influence associated with the probability of bank savings adoption among respondents. Since EDUCATION , FARM SIZE and INCOME are not significant in the EHA model, this suggests that these variables are related to timing of adoption but not the probability of adoption.

[INSERT TABLE 3 ABOUT HERE]

With respect to the influence of AGE, the coefficient of .015 suggests that older respondents were more likely to save with banks than younger respondents. This result is difficult to explain except that one may attribute it to farm ownership. Thus, older farmers are likely to be farm owners and would therefore have a greater need for banks than younger farmers. The fact that AGE increases the likelihood of early adoption as well is reflected ,thus, the results suggest that older farmers were more likely to be early adopters than younger farmers.

The .067 coefficient on SAVINGS RATIO in the EHA estimates suggests that the probability of ultimately adopting a bank for savings was higher among respondent who have already developed the savings habit. This relationship is intuitive since any savings behavior requires the ability to save significant proportions of earnings.

FARM SIZE, INCOME, and EDUCATION have significant effects in the Logit model. This means that these three predictor variables are related to the probability of adoption, but have no effects on timing of adoption because these variables are not significantly related to the timing of adoption in the basic duration model. Also, they are not significant in the EHA model. This may be because the results of the EHA model affected by the effects of DURATION as well as the probability of adoption. This results implies that these variables are associated with the probability of ultimate adoption but not with the likelihood of early adoption.

#### MARKETING AND BANK RELATED VARIABLES AS ADOPTION CORRELATES

Table 4 presents estimates for the EHA, logit and basic duration models for bank related and marketing related factors. As the Table shows, the overall EHA model was significant at .10 level, but, the overall logit  $-2\text{Log L} = (413,112)$ . These differences may reflect the methodological differences among the three models. As

noted earlier, the EHA model estimates the probability of ultimate adoption, while the basic duration model estimates the adoption decision with respect to only the timing of the adoption decision. On the other hand the logit model estimates the likelihood of adoption without regard to time. Thus, the EHA estimates are more comprehensive with respect to the reality of the adoption decision. Moreover, the standard errors of the estimated parameters are consistently lower in the EHA models. Consequently, these results suggest that bank-related features and marketing variables are not significantly related to the probability of the ultimate adoption decision but are associated with the timing or likelihood of early adoption of the bank savings habit. From this perspective SERVICE I (customer service expectations) is significant; and in the Logit model ( $p < .01$ ). SERVICE II (customer satisfaction with service) is also significant in all three models. ATTITUDE I (customers' expectations about attitude of bank personnel) has an impact on the probability of adoption in the EHA model and the basic model. ATTITUDE II is significant in the basic duration model and logit model. The importance of these factors in accelerating the bank savings adoption decision is examined next.

[INSERT TABLE 4 ABOUT HERE]

The coefficient of  $-.279$  for SERVICE I in logit duration model suggests that the more respondents expected that they would receive convenient and helpful service at of their designated banks there more likely there were to be eventual adopters of the bank savings habit. This relationship suggests that the encouragement of convenient banking services by development planners may have the positive impact on ultimate adoption.

Significant negative coefficients of all three models suggest that respondents who were satisfied with the level of customer service were less likely to be early adopters of the bank savings habit with their designated banks. This finding is not as counterintuitive as it may first appear when considered in the context of the banking system. As mentioned before, prior to the introduction of the special farmer's bank system, many farmers had experienced considerable delays in collecting their produce checks. The introduction of the farmers' bank system increased the convenience of banking system for farmers. Thus, farmers who had no need for bank savings services may therefore have found the system's emphasis on speed of service to enhance their produce check cashing needs. In fact, separate analysis elsewhere revealed a positive influence of speed of service on other bank services such as cashing of the farmers produce check (Dadzie and Dadzie 1996)]. These farmers, especially

those with other banks savings accounts prior to the farmers' bank system were thus encouraged by the convenience of service to cash their produce checks and not save any portion of it.

With respect to bank-related variables, the estimates in the logit model are significant implying that perceived benefits of banks (such as the security of holding money at the bank, interest earnings on banks, the possibility of building credit history, etc.) Affects the probability of adoption banks for savings purposes but is not associated with the timing of the adoption decision.

Overall, these results suggest that marketing controlled variables, including customers' expectations of service, have positive effect on ultimate adoption, customers' satisfaction with attitude of bank personnel, may have a negative effect on early adoption and the probability of adoption.

#### DISCUSSION AND CONCLUSION

Given the immediate and long-term success of the Ghanaian approach, several macro marketing policy implications emerge from results of this study. The first implications derives from the EHA results which suggest that the probability of adoption of the bank savings habit among the Ghanaian rural consumers was related to only a few socio-demographic variables, namely, AGE and SAVING RATIO. In addition, FARM SIZE and, EDUCATION, and INCOME had a significant effect on the probability of adoption but not on timing or early adoption. This suggests that the most critical variables to focus on for the purpose of designing similar programs in other LDCs are households with older farmers who have already developed the savings habit. These individuals are not only easy to identify in most rural communities but also they constitute a significant proportion of the population of these communities. The fact that farmers' income may be meager or that they are mainly illiterate should not preclude the ultimate adoption of the bank savings habits since both EDUCATION and INCOME only impact the timing but not the probability of adoption among potential adopters- older consumers who have already developed the savings habit.

The second implication of the present study pertains to the role of marketing controlled variables in the apparent success of the Ghanaian approach. The study results indicate that SERVICE I (customers' expectations of service quality) had a positive influence on a) both the probability of adoption and the likelihood of early adoption, and b) ultimate adoption. In addition, ATTITUDE I (customers' expectations regarding the attitude of bank personnel), had a positive effect both the probability of adoption and timing of adoption. These findings suggests the rapid rate of adoption of bank savings in the Ghanaian system was partly a function of the strong

marketing-orientation of the program. This implies that a marketing strategy for rural savings mobilization aiming at increasing rural consumers expectations of service quality and personal banking environment could increase the rate of adoption of banks for savings purposes in other LDCs. Key strategy variables would be to stress satisfaction with the functional and locational convenience of the banks, specially trained bank personnel to provide friendly, accurate and reliable services to largely illiterate rural consumers were helpful in accelerating bank savings adoption. The fact that these marketing controlled variables were achieved without incurring the huge infrastructural investments that seem to retard the diffusion of banks into rural societies in Africa make the Ghanaian approach transferrable to other African countries. Since many African countries and other LDCs with agricultural export economies have similar marketing boards with similar facilities, the Ghana approach may be adapted in these countries as well to remove the "Western or "urban" orientation for rural consumers..

The third implication pertains to the differences in the estimates provided by the three models. The EHA estimates were not only consistently lower than those of the logit and regression models, but they seemed more parsimonious with respect to the influence of marketing controlled variables. While three of the marketing controlled ( SERVICE I, SERVICE II, ATTITUDE II , and BENEFITS ) were highly significant in the logit model, ( $p < .01$ ) only two (SERVICE II and ATTITUDE I ) were significant in the EHA model ( $p < .01$ ) and three variables (SERVICE II, ATTITUDE I, and ATTITUDE II) were significant in the basic duration model ( $p < .01$ ). These different results may reflect the presumed methodological advantage of the EHA model over logit and the basic duration model, given the comprehensive nature of the EHA model. However, these results can not be asserted with full confidence, as always, given the limitations of the EHA model. While it is more comprehensive than traditional logit models because it integrates duration and timing of adoption, the EHA model does not include other important variables such as volume of first purchase or repeat purchase. (Chandrashekeran and Sinha 1995). Hence, the results of this study would have to be confirmed by analyses with more comprehensive models to verify that they are not seriously affected by efficiency loss (Chandrashekeran and Sinha 1995). Such studies could consider savings propensity as a proxy for volume of first time savings in order to provide a more comprehensive estimate of the bank savings habit adoption-diffusion process.

In conclusion, the specific contribution of this paper is in validating the efficacy of EHA over traditional diffusion methodology in LDC savings Mobilization planning. The purpose of rural banking saving policy in most LDCs is mainly to increase the number of rural consumers with savings account and to accelerate the bank

savings adoption processes. Given the limited resources of most LDCS, the most efficient way to pursue both goals may be to identify the variable(s) which may increase the chance of early adoption and the probability of adoption simultaneously to conserve resource. The EHA model helps to identify both categories of variables while the regression and Logit models can identify one set of variables- those that effect the timing of adoption or those that affect the probability of adoption respectively. In this research, the EHA model identified AGE, SAVINGS RATIO, and marketing controlled variables such as SERVICE and ATTITUDE expectations as the variables which effects both the timing and the probability of ultimate adoption. More research of this kind is needed to provide more insight into the methodological advantage of EHA. Some of the specific EHA research applications include the use of EHA to select the relevant variables for designing bank services, for segmenting and positioning banks and formal financial institutions in rural financial markets, and for examining the multiple adoption unit question. It is hoped that this paper will help generate interest among marketing and development researchers in the use of EHA to investigate rural savings mobilization issues.

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**TABLE 1: SUMMARY OF VARIABLES AND DESCRIPTIVE STATISTICS**

Variable	Definition and Measure	Statistics
Duration	Timing of adoption: Number of years from system's launch to first bank savings	1.81 years (mean)
Adopter/ Non-adopter	Adopter: a respondent who has opened a bank savings account any time since the launch of system	71.4 percent
Education	Years of formal education	8 years (mean)
Age	Age of respondent in years	53.1 (mean)
Children	Number of dependent children	8.64 (mean)
Innovativeness	Innovative orientation: measured by 10 item 5-point likert scale	3.40 (mean) .74 (coefficient alpha)
Savings ratio	A measure of savings propensity: the proportion of farm income saved with banks	.22 (mean)
Service I	Expectations of service quality measured by a six item 5-point likert scale including convenience of hours, days, speed of service, reliability and accuracy and locational convenience	3.70 (mean) .76 (coefficient alpha)
Service II	Satisfaction with service quality measured by a six item 3-point scale in Service I	1.92 (mean) .80 (coefficient alpha)
Attitude I	Expectations regarding attitude of bank personal measured by a four item 3-point scale including trust, helpful, courteous, and language	1.98 (mean) .85 (coefficient alpha)
Attitude II	Satisfaction with attitude of bank personnel measured on the 5-point scale as used in Attitude I	3.78 (mean) .69 (coefficient alpha)
Bank benefits	Satisfaction with benefits of savings with banks measured on a four item 3-point scale including security, interest, credit history and ease of use	2.01 (mean) .62 (coefficient alpha)

**TABLE 2: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE SAMPLE**  
(N = 2123)

	Total
Education	.8
(1) None	39.8
(2) Some elementary school	19.4
(3) Completed elementary school	32.4
(4) Completed secondary school	4.8
(5) More than secondary school	3.5
Income	
(1) Over 2 million cedis*	15.4
(2) Between 1 million and 2 million cedis	17.9
(3) Between 500,000 to 1 million cedis	22.5
(4) Between 250,000 and 500,000 cedis	20.0
(5) Between 100,000 and 250,000 cedis	16.1
(6) Under 100,000 cedis	7.9
Age	
(1) Over 60 years	34.6
(2) Between 50-59	28.8
(3) Between 40-49	22.3
(4) Between 30-39	12.9
(5) Between 20-29	1.5
(6) Under 20 years	0.0
Marital Status	
(1) Single	3.3
(2) Married	91.5
(3) Divorced	2.3
(4) Widowed	2.9
Banking experience prior to check program	
(1) Prior experience	51.6
(2) No experience	48.4

\* Cedi is the local currency. The 1995 conversion rate of the cedi to U.S. \$ was approximately 1,000 cedis to \$1:00

**TABLE 3: INFLUENCE OF SOCIO-DEMOGRAPHIC AND INDIVIDUAL CHARACTERISTICS**

Variables	EHA Model	Basic Duration model	Logit model
Intercept	NA	6.800(1.317) <sup>a</sup>	-1.318(.497) <sup>a</sup>
Age	.015(.004) <sup>a</sup>	.059(.015) <sup>a</sup>	.010(.005) <sup>b</sup>
Farm size	.006(.005)	.022(.018)	.018(.007) <sup>a</sup>
Income	.031(.041)	.082(.139)	.159(.050) <sup>a</sup>
Education	-.110(.011)	-.029(.037)	.039(.014) <sup>a</sup>
Children	.006(.009)	.049(.037)	-.001(.014)
Savings ratio	.067(.028) <sup>b</sup>	.118(.092)	-.043(.073)
Innovativeness	-.078(.061)	-.035(.205)	.044(.080)
Summary Statistics			
-2 LOG L	4391.864 <sup>a</sup>		1321.962 <sup>a</sup>
F-value		5.989 <sup>a</sup>	

<sup>a</sup> p < .01

<sup>b</sup> p < .05

<sup>c</sup> p < .10

Note: Table values in parenthesis are standard errors of estimated parameters. Analysis is based on the sample of respondents who had no prior experience with banks, N= 1090. Because of missing values, the effective sample size varies from 420 (i.e., for adopters only) in the basic duration model, to 980 in the Logit and EHA models.

**TABLE 4: INFLUENCE OF MARKETING CONTROLLED AND BANK-RELATED VARIABLES**

Variables	EHA Model	Basic Duration model	Logit model
Intercept	NA	11.042 (.872) <sup>a</sup>	1.807 (.361) <sup>a</sup>
Marketing variables			
Service I	.033 (.062)	.225 (.211)	.279 (.086) <sup>a</sup>
Service II	-.340 (.122) <sup>a</sup>	-1.687 (.398) <sup>a</sup>	-.575 (.158) <sup>a</sup>
Attitude I	.323 (.122) <sup>a</sup>	1.475 (.418) <sup>a</sup>	.069 (.170)
Attitude II	-.104 (.073)	-.500 (.253) <sup>b</sup>	-.602 (.103) <sup>a</sup>
Bank-related variable			
Benefits	-.001 (.108)	-.040 (.387)	.357 (.155) <sup>b</sup>
Summary Statistics			
-2 LOG L	4605.291 <sup>c</sup>		1413.112 <sup>a</sup>
F-value		4.328 <sup>a</sup>	

<sup>a</sup> p < .01

<sup>b</sup> p < .05

<sup>c</sup> p < .10

Note: Table values in parenthesis are standard errors based on a sample of 1090 respondents. Effective sample size varies from 420, in the basic duration model, to 980 in the Logit and EHA models because of missing values in the case of the last two models.